HAMANN, DONALD LEE

AN ASSESSMENT OF ANXIETY IN INSTRUMENTAL AND VOCAL PERFORMANCES

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AN ASSESSMENT OF ANXIETY IN INSTRUMENTAL AND VOCAL PERFORMANCES

by

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Musicians tend to agree that performing in public stimulates performer anxiety. How musicians respond to anxiety in musical performance can vary. Although musicians may agree that anxiety is present in public performance and that anxiety can help or hinder performance skills, thus affecting the quality of the performance, there is little empirical research in music to support either of these beliefs.

The purpose of this study was to investigate the effect of anxiety in musical performance.

Ninety music students, five graduates and 85 undergraduates, studying privately at the University of North Carolina at Greensboro, served as subjects. There were 42 male and 48 female subjects.

Criteria for subject selection were based on each subject's ability and willingness to perform and record a musical composition in two performance situations within a five-day span.

Subjects, 15 in each of six performance areas--piano, bowed string, woodwind, brass, voice, and guitar--performed one composition of their choice in two performance situations. The performance conditions were an enhanced anxiety situation where an instructor and peers formed an audience, and a reduced anxiety condition where subjects performed in a room with only tape-recording equipment present. All performances were recorded. Three adjudicators evaluated recorded performances for musical quality using researcher-developed, pilot-tested rating forms.

The State-Trait Anxiety Inventory (STAI) and the State-Trait Personality Inventory (STPI) were administered to determine state and trait anxiety, curiosity, and anger under both performance conditions. A questionnaire, developed and pilot-tested by the researcher, was administered to collect additional data.

Analyses of data were based on results from the questionnaire, adjudicator-rated performances, and the STAI and STPI. Quotient of agreement statistics and Pearson product-moment correlation coefficients were computed on performance rating scores to determine reliability and inter-judge reliability. Eight two-way analyses of variance (ANOVA split-plot designs with equal-sized subgroups, one two-way ANOVA split-plot design with unequal-sized subgroups, and 15 chi-square analyses were used to analyze data.

On the basis of analysis it was found that performance condition and subjects' years of formal training, subjects' performance area, and subjects' sex interacted in their effects on judged performance quality ($p < .05$); subjects with High A-Trait anxiety and curiosity exhibit significant ($p < .05$) increases in A-State anxiety and curiosity; and subjects performing in enhanced anxiety situations exhibit significant ($p < .05$) increases in A-State anxiety and anger.

All other hypotheses failed to be rejected at the .05 level, relating to areas such as: (1) interactions on STAI and STPI mean state anxiety or STPI mean state curiosity and anger (dependent variables) with STAI and STPI trait anxiety or STPI trait curiosity and anger scores and performance condition (independent variables);

(2) differences between or interactions on mean performance ratings (judges' performance scores), dependent variables, with trait anxiety and performance condition (independent variables); and (3) independence of performance condition and such variables as years of nonformal study and ensemble experience, performance "readiness," and subjective evaluations of performance ability, experience, or "readiness" on their effects on judged performance quality.

It was observed that 58% of subjects' performances were judged "superior" in the enhanced anxiety situation while only 42% of subjects' performances were judged "superior" in the reduced anxiety situation. Subjects with High formal training (11 through 15 years), performers on piano and bowed string instruments, and female subjects performed in a superior manner in the enhanced performance situation, as determined by adjudicators, as compared to subjects with Medium (6 through 10 years) to Low (1 through 5 years) formal training, woodwind, brass, vocal, or guitar performers, or male subjects, respectively.

Based on analyses of data and researcher observations, it was concluded that anxiety may not be detrimental to judged quality of subjects' performances and may enhance performance.

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CHAPTER I

INTRODUCTION

Musicians tend to agree that performing in public stimulates performer anxiety (defined as physical and mental deviation from a "normal state"). How musicians respond to anxiety in musical performances can vary. Havas (1978) states:

> As all performers know, nobody plays the same in public as he does alone. One plays either much better or much worse. When the audience acts as a stimulus to the performer, so that he can release his inborn anxiety through his playing, the performance usually becomes sparkling and exciting. But when the anxieties are exaggerated before an audience and the player knows that he is unable to communicate the music, it is then that neuroses set in. If this becomes a regular occurrence the player sometimes ends up with a nervous breakdown (p. 13).

Although many musicians may agree that anxiety is present in public performances and that anxiety can help or hinder performance skills, thus affecting the quality of the performance, there is little empirical research in music to support either of these beliefs. The purpose of this study is to measure and determine the effects of anxiety in musical performance.

Anxiety and the Musician

Throughout history musicians were expected to perform for heads of state, to entertain royalty, and in general, to earn livings from their art. Failure to produce desired results during performances may

have meant that the musician would not be able to support self and family. Such performance conditions and pressures must have produced some degree of anxiety and concern for the effects of anxiety in performances.

Many musicians today are also concerned with anxiety in performance. Havas (1976) and Grindea (1978) have discussed the attributes and problems involved with anxiety in performance. Articles in music journals have appeared in which problems, attributes, and causes of anxiety in performance are discussed (Diercks, 1978; Gloyne, 1965; Martin, 1965; Wagner, 1964). Grindea (1978) states that "the slightest hesitation or emotional anxiety during the performance creates inner nervous tension . . . which is almost simultaneously transmitted to various parts of the body--usually to the weaker parts of the playing apparatus--causing muscular tension" (p. 104). Muscular tension, believed to be caused by anxiety, can inhibit the musician in a performance, and may lead to decreased performance quality.

Anxiety: Negative Aspects in Musical Performance

Negative performance-generated anxiety conditions can be produced or result from a variety of inhibitory factors. Waite (1977) categorized inhibitory factors into four areas.

1. Heightened awareness and concern with the motor activity and mental processes.
2. Self-consciousness from a threatened ego.
3. General bodily tension.
4. Recurring conditioned anxiety.

Performers who are negatively affected by anxiety may, in a performance situation, become overly concerned with technical inabilities on the instrument. They can concentrate only on negative physical and mental aspects of their performance practice. Another threat which can be present in this type of situation is that which involves the ego. Performers often feel that a poor performance, especially in front of their peers, reflects their quality as individuals. Such thinking in the performance situation can cause unjustified concern. Many times this type of ego threat promotes excess bodily tension which inhibits performance ability.

Inhibitory factors can create performance situations in which musicians become uncertain of technical abilities and mental capacities. Performers may feel uncertain of past performance experiences or express concern over a lack of performance experience. These concerns can stimulate anxieties, which may create excess muscle tension. The tension can inhibit physical abilities which could affect mental concentration.

An example of negative factors in anxious performance situations can be discussed in terms of string players. Response to anxiety by the string player can result in highly disruptive events; dropping or losing control of bows and instruments. Performers have been known to "fall off" the fingerboard when shifting or momentarily engage fingers underneath strings. String performers often develop "shaky" bow hands which affect the tone and consistency of tone production. Muscular tension in the left hand causes a sense of physical immobility. This immobility creates a physical and mental situation which

decreases the ability to perform technically difficult and rapid passage work. Excess muscular tension can affect vibrato production. A relaxed vibrato motion can become tense and result in a "nervous" sounding oscillation. Performers may play out of tune either by overcompensating for physical tension created in other areas or by becoming so anxious that they fail to listen and adjust pitch when necessary.

In general, a variety of factors may contribute to an overall adverse affect on performers in anxious performance situations. Mental concentration may wane when performing music from memory, thus creating a situation which could allow for minor or major memory "slips." When performing from music, musicians may experience a blurring or running together of notes, skip lines of music, fail to turn pages in time, or turn too many pages at once. Performers can be adversely affected by muscular tensions, resulting from the anxious situation, which may show in extraneous and distracting bodily motions and movements, facial contortions, and reduced ability to perform technically on an instrument. Physical distractions and reduced technical ability diminish the quality of a performance, and when combined with mental inhibitions and inattentiveness can result in decreased performance effectiveness.

Anxiety: Positive Aspects in Musical Performance

The experienced or professional musician is often thought to benefit from anxiety. Grindea (1978) states "A skilled performer instinctively maintains a perfect balance between generating and

releasing tension, thus creating the illusion of continuous movement" (p. 97). Anxious performance situations are viewed by some musicians to be beneficial and desired. For these performers, anxiety or anxious situations allow for a state of increased mental and physical ability and perception.

Performers who benefit from anxious performing situations may gain physical endurance and improve tonal production and pitch control. Rapid or technically difficult passages become readily and easily playable. Heightened awareness of mental and physical capacities can enable performers to enhance performances through tonal, dynamic, technical, and musical improvement. When musicians benefit from anxious situations, they feel that direct communication with body, mind, and instrument has occurred. This is conveyed to the audience, and in effect becomes part of the music and part of an aesthetic experience.

Summary of anxiety: Negative and positive aspects. The belief that anxiety for some performers hinders their performances and that anxiety for others enhances their performances is largely speculative. Few research studies have been published in the area of anxiety and musical performance. Within these limits, the majority of studies reported have dealt with anxiety reduction. Researchers assumed that anxiety diminished the quality of performance. These researchers generally conclude that anxiety reduction does not diminish the quality of a performance or that anxiety reduction improves the quality of a performance. Unbiased, published anxiety research studies, which objectively attempt to assess the effect of anxiety in musical performance, are virtually nonexistent. Spencer (1969) investigated the relationship

of situational anxiety to college freshmen's vocal performances under two performance conditions. A study completed by Leglar (1978) was set up to ". . . ascertain whether or not the anxiety of the performer increased with the absence of the musical score and whether or not anxiety increased in relation to the number and calibre of the audience" (p. 5201A). Although Leglar reports findings in the area of anxiety effect on performance level, the primary objective of the research was not established to investigate the relationship directly. A study by Hamann and Herlong (1979) was completed in the area of assessment of anxiety in musical performances of guitarists in which the primary objective was to investigate the relationship of anxiety, in anxious and reduced anxious performance situations, and judged performance quality.

Does anxiety diminish or enhance the quality of a performance? More research needs to be undertaken to assess the effects of anxiety on performers. Anxiety research in music is limited, but anxiety research in learning behavior is substantial by comparison. A study of theories, in this area, could provide for insights and possible relationships in music.

Learning Theories in Anxiety

Insight into research on anxiety in musical performances may be gained by investigating theories based on research on anxiety in learning. One such theory, which could contribute to a study of anxiety in musical performance is referred to as Drive Theory (Spence, 1958; Spence & Spence, 1966; Taylor, 1951; Taylor, 1956). Based on Hullian Learning Theory (Hull, 1943), Drive Theory deals with

anxiety in simple to complex learning tasks with subjects ranging from low to high anxiety levels. An extension of Drive Theory by Spielberger (1971), deals with anxiety and learning for subjects who differ in intelligence compared to the stage of learning and the complexity of the learning task.

Drive Theory has recently been supplemented by Spielberger's Trait-State Anxiety Theory (1966a, 1972a). According to Heinrich and Spielberger (1978), Spielberger's Trait-State Anxiety Theory ". . . distinguishes between anxiety as a transitory emotional state (A-State) and as a relatively stable personality trait (A-Trait), and specifies the conditions under which different levels of A-State are aroused in persons who differ in A-Trait" (p. 2).

Drive Theory

Hull (1943) believed that excitatory potential (E), which has the effect of determining the strength of a response (R), is a multiplicative function of the total effective drive state (D) and habit strength (H). Therefore, $R = f(E) = f(D \times H)$. Drive Theory (Spence, 1958; Taylor, 1956) is an extension of Hullian Learning Theory. Spielberger (1971) reports the following concerning Drive Theory.

> While Drive Theory does not explicitly differentiate between trait and state anxiety, this distinction is implicit in Spence's Reactive Hypothesis [1958] which may be restated as follows: Ss [subjects] high in A-Trait will respond with greater elevations in A-State than low A-Trait Ss in situations involving some form of stress. It follows that the concept of D is logically more closely associated with A-State than with A-Trait, and that the assumption that Ss with high scores on A-Trait measures will be higher in D than Ss with low A-Trait scores is questionable (p. 273).

When applying Hullian Learning Theory to Drive Theory the following predictive assumptions on levels of learning are reported by Heinrich and Spielberger (1978, p. 3).

1. For simple or easy learning tasks, in which correct responses are dominant and competing error tendencies are minimal, the performance of high-anxious subjects will be superior to that of low-anxious subjects.

2. For difficult learning tasks, in which competing error tendencies are strong relative to correct responses, high drive will activate these error tendencies and the performance of high anxious subjects will be inferior to that of low anxious subjects.

3. For tasks of intermediate difficulty, the stage of learning is taken into account. High anxiety will be detrimental to performance early in learning when the strength of correct responses is weak relative to competing error tendencies. Later in learning, high anxiety will begin to facilitate performance as correct responses are strengthened and error tendencies are extinguished.

Spielberger's extension of Drive Theory reports the effects of anxiety and intelligence on performance on learning tasks that vary in difficulty. Predictions relating to Spielberger's extension of Drive Theory are summarized by Heinrich and Spielberger (1978, pp. 4-5).

1. For subjects with superior intelligence, high anxiety will facilitate performance on most learning tasks. While high anxiety may initially cause performance decrements on very difficult tasks, it will eventually facilitate the performance of bright subjects as they progress through the task and correct responses become dominant.

2. For subjects of average intelligence, high anxiety will facilitate performance on simple tasks and, later in learning, on tasks of moderate difficulty. On very difficult tasks, high anxiety will generally lead to performance decrements.

3. For low intelligence subjects, high anxiety may facilitate performance on simple tasks that have been mastered. However, performance decrements will generally be associated with high anxiety on difficult tasks, especially, in the early stages of learning.

In both Drive Theory and Spielberger's extension of Drive Theory, mastery of a task (habit strength) and anxiety are related. While Drive Theory does not explicitly differentiate between trait and state anxiety, investigation of the research literature reveals that high A-Trait subjects tend to show performance changes attributable to higher D in situations characterized by psychological stress, but not in situations involving physical dangers or threats of harm (Spielberger, 1971). Although measures of A-Trait were obtained in research that supports Drive Theory, Drive (D) can be associated with differences in A-State. Spielberger (1971) reports the following concerning drive level and elevations in A-State anxiety.

> Assuming that elevations in A-State reflect drive level, drive theory delineates the complex effects of differences in A-State (D) on performance. According to the theory, the effects of A-State on performance in a learning task will depend upon the relative strengths of the correct habits (responses) and the competing error tendencies evoked by the task. On simple tasks, in which correct responses are stronger than error tendencies, high A-State would be expected to facilitate performance. On complex or difficult tasks, in which error tendencies are stronger than correct responses, it would be anticipated that high A-State would interfere with performance, at least in the initial stages of learning (p. 274).

Spielberger (1966a, 1972a) supplemented Drive Theory with Trait-State Anxiety Theory in order to specify the conditions under which subjects differing in A-Trait would be expected to show differences in A-State (D).

Trait-State Anxiety Theory

Trait-State Anxiety Theory is based on the assumption that while A-Trait measures may provide predictive information regarding the "probability" that high levels of A-State would be aroused, the most effective measure of ascertaining A-State change is by using an A-State measure along with an A-Trait measure in a situation. The following assumptions of Trait-State Anxiety Theory with regard to arousal of A-States is reported by Spielberger (1971, p. 277).

1. In situations that are appraised by an S [subject] as threatening, an A-State reaction will be evoked. Through sensory and cognitive feedback mechanisms, high levels of A-State will be experienced as unpleasant.

2. The intensity of an A-State reaction will be proportional to the amount of threat that the situation poses for S. The duration of an A-State reaction will depend upon the persistence of S's interpretation or appraisal of the situation as threatening.

3. High A-Trait Ss will perceive situations or circumstances that involve threats to self-esteem, such as failure or negative evaluation of performance, as more threatening than will Ss who are low in A-Trait, and will respond to such situations with greater elevations in A-State.

4. Elevations in A-State have motivational or drive properties that may directly influence behavior, or serve to initiate psychological defenses that have been effective in reducing A-States in the past.

In all theories discussed, A-State anxiety is thought to have motivational or drive properties. In Drive Theory and Spielberger's extension of Drive Theory, A-State (D) can enhance or facilitate

performance in tasks in which subjects possess high training or ability. For subjects with low training or ability, high A-State anxiety is thought to deter performance.

The Relationship of Learning Theories to Musical Performance Anxiety Research

Perhaps the most important aspect of learning theories, as discussed in relation to research on anxiety in musical performance, is the relationship between learned tasks (training) and anxiety. In learning theories a statement is made concerning the effect of low and high anxiety (A-State [D]) in subjects when performing previously learned tasks. It can be concluded that high-anxious subjects, when performing tasks in which they are experienced, possess a "high" degree of ability, or have a high degree of intelligence to perform those tasks with superior effectiveness than do low-anxious subjects possessing the same traits or qualities.

In music, such theories could provide a foundation from which prediction of on performance quality anxious situations could be made. On the basis of the learning theories discussed, explanation of the increased performance abilities of some performers and decrements for others in anxious situations, could be formulated. If it is true that some musicians' performances are enhanced by their anxiety and that other musicians' performances are not, the difference between these performances and subjects may be investigated. A study of possible factors affecting performers should be made.

Possible Factors Affecting Musical Performances

Examination of learning theories in anxiety provides information from which research study of musical performances may be developed. Carron (1971), Spence (1958), Spielberger (1966a, 1972a), and Taylor (1951) indicate that training and ability are important factors in anxiety research. It would be important to identify factors that represent musicians' training. It may also be important to identify mental attitudes of performers as possible ability factors contributing to results in performance situations.

Possible training factors. Three possible factors indicating musicians' training are years of formal study, years of nonformal study, and years of ensemble experience on an instrument or voice. (Further reference to voice will be included in the noun instrument.) Formal years of study is defined as study on an instrument, on a "one-to-one" basis, with an instructor. Nonformal years of study will be defined as self-taught instruction or instruction received in a group situation such as public school instrumental training. A definition of ensemble experience is participation in any group of two or more members in civic, elementary or secondary school, or university situations.

It could be hypothesized that performers who have had formal study have acquired performance experience. Formal study provides for a consistent type of performance situation, one in which the student performs for, and is being evaluated by an instructor. A projected research question could be: Do subjects with high formal years of study perform in a superior manner, compared to subjects with low formal years of study in anxious situations? According to Drive

Theory, the performance of high-anxious subjects with high training will be superior to that of low-anxious subjects with high or equal training. This statement from Drive Theory could also form the basis of a similar question in music research. Do high anxious subjects with high formal years of study perform in a superior manner, compared to low anxious subjects with equivalent training?

An investigation of years of nonformal study on an instrument and performance results in anxious situations could also be of interest. Musicians often have had more nonformal years of study than formal years. It would be of interest to determine whether such study has any effect on the performer's ability to satisfactorily perform in anxious situations. Research questions similar to those that were stated when discussing formal study could also be studied when investigating possible relationships between nonformal years of study and performance practice.

A final indication of training may be years of ensemble study. Typically, musicians in ensembles perform in public situations. Some degree of anxiety may be present for performers in these situations. Since evaluation in such performances is usually directed toward an ensemble and not toward individuals, a degree of positive reinforcement concerning performance practice in anxious situations may be achieved by individuals. The following question could be of interest to the music profession. Is there any relationship between the quality of solo performance in anxious situations and years of ensemble experience? Performers who have had a large amount of ensemble experience may be more at "ease" in solo performance situations.

Researchers in learning behavior have developed theories which associate training and ability with expected response to anxiety. These factors may also influence musicians' response to anxiety in performance situations. If this were supported, learning theory statements could be applied and used as predictors of anxiety response in musicians.

Possible mental factors. Mental readiness is as important as physical (technical) readiness in a musical performance (Gruner, 1978). For example, musicians who have high training but low mental readiness may not perform as well as musicians with moderate training but high mental readiness. Mental unpreparedness may result from lack of prior performance experience, lack of confidence when performing from memory or music, or lack of confidence with an accompanist.

Musicians with low performance experience may perform in a superior manner, compared to musicians with high performance experience. If musicians, who may have performed "few" recitals, have the attitude that their ability to perform is highly developed, then they may perform in a superior manner, as compared to musicians who may have "considerable" experience, but do not consider their performance abilities to be highly developed. Thus, mental preparedness could be thought to be an ability to perform tasks, with comparative success, in spite of training or experience. In all situations discussed, performers' concepts or attitudes (mental readiness) may influence their response to anxious performance situations.

Problem Statement and Overview of Method

There are many factors which can affect musical performance. A factor that can assist one performer may not help another. It is important to determine the types of variables and the degree to which they can affect a performance. Musicians are concerned with the negative aspects of anxiety in performance as well as the positive effects. There is a need to identify factors that may affect, either negatively or positively, performer anxiety in performance.

The purpose of this study was to measure human response to anxiety in musical performance. Two performance situations were established to examine the effects of anxiety on performers. Measures of anxiety used were the State-Trait Anxiety Inventory [STAI] (A Self-Evaluation Questionnaire) (Spielberger, Gorsuch, & Lushene, 1970) and the State-Trait Personality Inventory [STPI] (Spielberger, Barker, Russell, Silva De Crane, Westberry, Knight, & Marks, 1979). Additional data were collected using a questionnaire developed by the researcher. Measures of individual performance quality were determined by a panel of judges. Subjects performed and were recorded in an enhanced anxiety and a reduced anxiety situation. Anxiety level and performance quality were assessed.

Results from this study could aid prediction in future research studies in music and anxiety. Research in such areas as the establishment of high and low anxiety performance situations, measurement of anxiety in musical performance, evaluation of performances, and determination of possible factors affecting musical performance could

provide information which may help performers and teachers to understand and predict performance practices in anxious situations.

The basic research question investigated is whether anxiety improves or diminishes the quality of a performance. The extent to which certain factors contribute to positive or negative performance effects is unknown and was also studied. Since few studies have been completed and published in this area, and virtually none have used objective evaluation of anxiety in music, there is a profound need for research investigating this subject.

CHAPTER II

RELATED LITERATURE

Case studies on anxiety have appeared in the literature since Freud's conceptualization of anxiety-neurosis in 1894. Although research in anxiety appeared in psychiatric and psychological literature with increasing regularity, relatively little experimental research in human anxiety had been published prior to 1950 (Spielberger & Diaz-Guerrero, 1976; Spielberger, 1966a).

Spielberger theorized that anxiety is a process consisting of a sequence of cognitive, affective, physiological, and behavioral events. Spielberger and Diaz-Guerrero (1976) report that:

> This process may be initiated by a stressful external stimulus that is perceived or interpreted as dangerous or threatening, or by a thought or idea that forecasts threat or that causes the individual to recall an earlier danger situation (p. 6).

Izard (1972) reviewed the substantive definitions of anxiety and reported as follows:

> I propose that anxiety involves fear and two or more of the fundamental emotions of distress, shame (including shyness and guilt), anger, and the positive emotion of interest-excitement. As already indicated, this formulation is implicitly or partially supported by almost all writers in the field--the survey of theoretical and operational definitions of anxiety showed that all the above fundamental emotions have been included by more than one author (p. 55).

It is assumed that most musicians would agree that musical performance in public can create an anxious situation; however, there

may be a lack of agreement as to the effect the anxious situation would have on their performances. Although there are few published studies on anxiety in musical performance, most researchers report that anxiety reduction is not detrimental in a musical performance or that conditions which produce high anxiety levels tend to result in poorer performance levels (Brantigan, Joseph, & Brantigan, 1978; James, Griffith, Pearson, & Newbury, 1977; Leglar, 1978; Liden & Gottfries, 1974; Nideffer & Hessler, 1978; Spencer, 1969; Terwilliger, 1972; Wardle, 1969, 1975; Wolfe, 1977). Although Hamann and Herlong (1979) found no significant statistical interaction between formal years of guitar study and performance condition they observed that, "of the five categories of years of formal study, the students with the most years of study were rated superior in the second [high anxiety] performance condition" (p. 17). These findings tend to support the belief that experienced musicians perform in a superior manner in anxious situations as compared with inexperienced musicians.

Measures of Anxiety

Three types of anxiety measures predominate in the anxiety research literature--physiological, psychological, and response to an inventory. Levitt (1967) and Hodges (1976) have reviewed these instruments assessing the physiological aspects of transitory anxiety states. Their assessments are included in the following discussion.

Anxiety and Physiological Measurements

Although physiological instruments have been used to ascertain anxiety states, there may be difficulties in evaluating data from these measures. Hodges (1976) concluded:

> Individuals under stress frequently report increases in heart rate, sweating, breathing, and other autonomic physiological responses as well as feelings of anxiety. However, the relationship between how a person feels and how he responds physiologically is very complex, even though common experience indicates a close relationship. In fact, one of the most puzzling aspects of research on anxiety is the failure for these two different kinds of dependent measures to correlate significantly when a person is under some kind of stress (p. 175).

Levitt (1967) reports that "physiological measures are seldom found to be related either to each other or to psychological indexes of anxiety, or to the intensity of stress. [Such inconsistency] . . . renders them unsuitable for use at the current stage of research on anxiety as a construct" (p. 57). Although there is not complete agreement among anxiety research specialists as to the appropriateness of physiological instruments in the measurement of anxiety, there tends to be agreement among these researchers that data from physiological measures can be difficult and at times puzzling to interpret.

Many problems are involved with the use of physiological measures in a study of anxiety in musical performance. Some of the measures (Sidowski, 1966) commonly used for physiological anxiety assessment in music are: the Galvanic Skin Response (GSR), muscle action potentials (EMG), the blood pressure cuff, and pulse rate devices.

Although physiological measures have been used in the study of anxiety in musical performance, the employment of such measures may induce irrelevant sources of stress, or physically inhibit performers (Jaeger, 1979; Spielberger, 1979). Levitt (1967) states that "a substantial number of factors affect physiological measurement at any moment" (p. 106). Musicians, especially performers of bowed string instruments, must be allowed considerable physical freedom in order to perform. The attachment of wires and discs may inhibit and constrain musicians and induce anxiety unrelated to the performance condition itself. Spielberger (1979) states that "the physical activity required in playing the musical instrument would introduce movement artifacts as well as psychophysiological changes unrelated to stress and anxiety" (p. 1). Eason (1979) stated that the use of physiological measures in a study of anxiety in musical performance might produce data that appear to be unrelated to other anxiety measures, but are probably related. He also stated that data gathered from physiological measures are difficult to interpret without extensive training. It was his belief that if physiological measures were to be employed by "untrained" researchers, data collected from these instruments should only be treated and used for exploratory purposes.

Although physiological measures have been used in studies in which anxiety effects were investigated, it would appear that the use of physiological measures in research studies of anxiety in musical performance may inhibit the performer both physically and psychologically and can produce results that are difficult to interpret without extensive training. Physical and psychological inhibition may lead

to increased and unrelated anxiety in musical performance. It is for these reasons that physiological measures should be carefully and throughly evaluated as to their appropriateness for research undertaken in music. If factors could cause physical discomfort or restriction, or inducement of unrelated anxiety in performance situations, other anxiety measures should be employed.

Anxiety and Psychological Measurement: Projective Techniques

Projective techniques are used to evaluate psychological aspects of anxiety states. These are techniques which present an unstructured or partly structured stimulus to an individual who responds by completing or interpreting the structure. This process reveals aspects of an individual's personality as interpreted by a clinical psychologist. The Rorschach Inkblot Test is an example of a projective technique. Both administration and interpretation require a specially trained examiner. Research on anxiety as assessed by the Rorschach Inkblot Test reveals very little consistency in empirical findings (Golfried, 1966; Neuringer, 1962). Levitt (1967) states "Among psychological measures, projective techniques offer some advantages, but these are outweighed by disadvantages" (p. 89). It is for these reasons that projective techniques are of questionable value for use by nonclinical psychologists. The difficulty of interpretation and administration of projective techniques, leaves the researcher in music in need of an easier and more effective way to measure anxiety.

The Anxiety Inventory

A widely accepted instrument for the measurement of anxiety in experimental situations is an anxiety inventory. An anxiety inventory is constructed to assess individual response to self and environment by means of a self-evaluation questionnaire. An inventory requires no special training for administration or scoring, as in an inkblot test, and can be easily applied to group situations. Anxiety inventories have greater reliability than do physiological measures or projective tests because they are less affected by extraneous factors (Levitt, 1967).

State-Trait Anxiety Assessment

One problem in anxiety research has been the failure to distinguish between transitory anxiety states and anxiety as a personality trait (Spielberger, 1972b, 1972c). According to Spielberger, "state anxiety is conceptualized as a transitory emotional state or condition . . . [which] may vary in intensity and fluctuate over time" (1970, p. 3). Trait anxiety is a measure of individual's anxiety proneness, which remains relatively stable, and can be considered a personality trait. In order to avoid ambiguity in interpretation, a state-trait distinction in anxiety measurement should be made. For example, persons who report they are anxious may be referring to a state or trait condition. Such statements may be interpreted as meaning that they are anxious "now" or that they are anxious "generally." It would appear that a measure that could ascertain state and trait anxiety differences is appropriate for use in anxiety research.

The State-Trait Anxiety Inventory (STAI)

Of the available state-trait inventories, Dieger (1978) reports that the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970) is considered one of the most carefully developed instruments designed to measure state-trait anxiety. Zuckerman (1976) states:

> Spielberger, Gorsuch, and Lushene (1970) have also found high internal consistency coefficients for both their trait and state STAI anxiety scales. They found high retest reliabilities for the trait scale (.7 - .9) and a median .3 retest reliability for the state scale. Spielberger et al. (1970) have found higher internal reliability coefficients when the STAI is given under conditions of psychological stress (p. 137).

Martens (1971) reports that the STAI possesses the most impressive credentials among state-trait anxiety scales and has good test-retest reliability and internal consistency.

The STAI consists of two self-report scales for measuring state anxiety (A-State) and trait anxiety (A-Trait). The A-State scale consists of 20 statements from which subjects are to indicate how they feel "at a particular moment in time" (See Figure 1). Subjects respond to each item on the A-State scale by rating themselves on the following four-point scale: (1) Not at all; (2) Somewhat; (3) Moderately so; (4) Very much so.

Figure 1

Three Items Excerpted from the A-State Scale of

The State-Trait Anxiety Inventory*

14.	I feel "high strung."	1	2	3	4
15.	I am relaxed.	1	2	3	4
16.	I feel content.	1	2	3	4

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As in the A-State scale, the A-Trait scale consists of 20 statements, but instead of indicating how they feel "at a particular moment in time," subjects are to respond how they "generally" feel (See Figure 2). Subjects respond to each item on the A-Trait scale by rating themselves on the following four-point scale: (1) Almost never; (2) Sometimes; (3) Often; (4) Almost always.

Figure 2

Three Items Excerpted from the A-Trait Scale of

the State-Trait Anxiety Inventory*

37.	Some unimportant thought runs through my mind and bothers me.	1	2	3	4
38.	I take disappointments so keenly that I can't put them out of my mind.	1	2	3	4
39.	I am a steady person.	1	2	3	4

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The theoretical basis underlying the construction of the STAI is formulated on the premise that a measure of trait anxiety should be stable and consistent. In contrast, a measure of state anxiety should be sensitive to specific conditions. The STAI is easily administered and scored, making it an excellent measure with which to work. In addition, high test-retest reliability and internal consistency make it an excellent measure to use for research in an anxiety study.

The State-Trait Personality Inventory (STPI)

The State-Trait Personality Inventory (STPI) (Spielberger, Barker, Knight, Marks, Russell, Silva De Crane, & Westberry, 1979) is a recently developed inventory. This inventory is a self-report questionnaire which measures other phenomena in addition to anxiety. It provides measures of state and trait curiosity, anger, and anxiety.

The A-State scale of the STPI consists of 30 statements from which subjects are to indicate how they feel "at a particular moment in time" (See Figure 3). Subjects respond to each item on the A-State scale by rating themselves on the following four-point scale: (1) Not at all; (2) Somewhat; (3) Moderately; (4) Very much.

In the STPI A-State scale there are ten statements which refer to anxiety, ten which refer to curiosity, and ten which refer to anger. In Figure 3, items 13 and 16 refer to anxiety, items 14 and 17 refer to curiosity, and items 15 and 18 refer to anger.

As in the A-State scale, the A-Trait scale of the STPI consists of 30 statements, but instead of indicating how they feel "at a

Figure 3

Six Items Excerpted from the A-State Scale of the State-Trait Personality Inventory*

13.	I feel nervous.	1	2	3	4
14.	I am in a questioning mood.	1	2	3	4
15.	I feel like breaking things.	1	2	3	4
16.	I am jittery.	1	2	3	4
17.	I feel stimulated.	1	2	3	4
18.	I am mad.	1	2	3	4

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particular moment in time," subjects are to respond how they "generally" feel (See Figure 4). Subjects respond to each item on the following four-point scale: (1) Almost never; (2) Sometimes; (3) Often; (4) Almost always.

In the STPI A-Trait scale, as in the A-State scale, there are ten statements which refer to anxiety, ten which refer to curiosity, and ten which refer to anger. In Figure 4, items 4 and 7 refer to anxiety, items 5 and 8 refer to curiosity, and items 6 and 9 refer to anger.

The STPI has been developed over the past year and is not commercially available at this writing. The preliminary manual for the STPI provides psychometric data collected on 198 male and 72 female Navy recruits, and 95 male and 185 female college students.

Figure 4

Six Items Excerpted from the A-Trait Scale of the State-Trait Personality Inventory*

4.	I feel satisfied with myself.	1	2	3	4
5.	I feel curious.	1	2	3	4
6.	I have a fiery temper.	1	2	3	4
7.	I am a steady person.	1	2	3	4
8.	I feel interested.	1	2	3	4
9.	I am a hotheaded person.	1	2	3	4

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Although the STPI has only recently been developed, its use as an exploratory measure in a study of research on anxiety in musical performance can provide an additional state-trait anxiety measure, and state-trait measures of curiosity and anger. Spielberger (1979), in personal correspondence concerning the use of the STPI in a study of anxiety in musical performance, stated:

> Since your experimental manipulation [in the study of anxiety in musical performance] involved increased stress, the primary emotional change should be in state anxiety. However, you might find differential changes in curiosity for experienced, capable musicians as contrasted with inexperienced, less-skillful individuals. I have no basis for making any predictions with regard to changes in anger as an emotional state, but would encourage you to use this scale [STPI] for exploratory purposes.

The use of the STPI in anxiety research on musical performance can add to the data already collected on this instrument and may provide for possible insights and approaches for further research in music.

Summary of Anxiety Measures

In the preceding discussion of anxiety measures, it was noted that certain measures may be difficult to use and score, or can cause unrelated anxiety and physical inhibition in subjects. Physiological measures of anxiety may cause unrelated anxiety and can physically restrain musicians in performance. Results of physiological measures can seemingly produce data that do not correlate with other measures or are extremely difficult to interpret without extensive training in physiological evaluation.

Projective techniques, such as the Rorschach Inkblot Test, are difficult to administer and to interpret. There appears to be a lack of consistency with empirical findings from research on anxiety using measures such as the Rorschach Inkblot Test.

Due to reasons previously stated, both physiological and projective techniques tend to be unsuitable for certain types of anxiety research. If anxiety measures are difficult to administer, score, or evaluate; if these instruments can induce unrelated anxiety and physically restrain or inhibit subjects, other measures of anxiety evaluation for anxiety research in music performance should be employed.

The anxiety inventory is easy to administer and score. It provides reliable and consistent anxiety measurement and is widely used and accepted by researchers on anxiety. The STAI is an inventory

that has been widely accepted by authorities in anxiety research, and has high internal consistency and test-retest reliability. It would seem that an anxiety measure, such as the STAI, would be a valuable and appropriate measure to use in the study of anxiety in musical performance.

Anxiety Research in Musical Performance

Anxiety research in the area of musical performance is limited. Published studies date from 1969 to the present. Although few studies have been published in this area, there appears to be an increasing interest in research of this type. Reportedly, studies in anxiety and its affect in musical performance are currently being undertaken nationally and possibly internationally. Clinton's dissertation research (unpublished and in progress), reported in the Council for Research in Music Education Dissertations in Progress (1980) bulletin, is based on a study of the assessment and treatment of anxiety in solo vocal performance.

Published research on anxiety in musical performance and studies that have been presented at national music conventions, can be grouped into three categories: Anxiety reduction and control through behavior modification techniques, anxiety reduction through beta-blockade agents, and assessment of anxiety in stressful situation.

Anxiety and Behavior Modification Techniques

Techniques such as Biofeedback, behavior modification procedures, Autogenic Training, and Progressive Relaxation have been used to

reduce or control anxiety in individuals. Wolfe (1977) conducted an experiment in which he investigated the relative effectiveness of self- versus therapist-administration of relaxation training and modified desensitization procedure utilizing electromyographic (EMG) biofeedback. Using 28 music students as subjects, Wolfe reported that:

> Both groups showed significant within and across session decreases in anxiety for both the relaxation training and modified desensitization procedure, with the Self-Administered group demonstrating slightly lower EMG levels throughout (1977, p. 924-B).

In Wolfe's study, the researcher appears to have made a basic assumption concerning the effects of anxiety in musical performance, that assumption being that anxiety deters musical quality in performance situations. In a similar study by Wardle (1970, 1975) this same assumption was also reported.

Wardle states that musicians would generally agree that anxiety in musical performance situations seems to be undesirable. The researcher employed systematic desensitization and insight-relaxation procedures to reduce anxiety in 30 performers. Subjects were administered treatments in systematic desensitization following the procedures established by Wolpe (1958). Subjects' performances were tape-recorded and evaluated by judges. The Watkins-Farnum Performance Scale was used for sight-reading examples. Heart-rate was monitored and recorded before, during, and after performances. Wardle (1975) concluded that ". . . behavioral and physiological anxiety reduction is not detrimental in performance and may be helpful to improved performance" (p. 191).

Terwilliger (1972), as part of a study to determine the appropriateness of group counseling in a music curriculum, researched the effectiveness of group counseling on vocal recital performances of undergraduate music students. Terwilliger stated:

> Music educators have expressed concern regarding their vocal music students' solo recital performance being negatively influenced by what they commonly refer to as "stage fright" or excessive "butterflies." This study . . . proposed group counseling as an appropriate amelioration (1972, p. 577A).

Although null hypotheses were not reported, the researcher stated that null hypotheses failed to be rejected. Based on data from subjects, Terwilliger stated: "Counseled student subjects' reported observations indicated that the group counseling experience has a positive impact on . . . recital performances" (1972, p. 577A).

In a study by Nideffer and Hessler (1978), the researchers were concerned with the effectiveness of anxiety reduction procedures with musicians. The Test of Attentional and Interpersonal Style (TAIS) was used to identify subjects who performed "poorly" under pressure and to evaluate the types of mistakes subjects might make under performance conditions. On the basis of results from TAIS, feedback programs were initiated in which tension control could be studied. Although no procedural information was reported or statistical evidence presented to support their findings, Nideffer and Hessler (1978) stated the following conclusion.

> The procedures presented offer individuals ways of coping with anxiety apart from simple additional practice or exposure. For some this alternative is an absolute necessity, for without it the individual would not be fortunate enough to achieve his goals (p. 153).

Summary of behavior modification techniques research. In comparison to the studies of Wardle (1970, 1975), Wolfe (1977), and Terwilliger (1972), Nideffer and Hessler (1978) did not assume that all musicians experienced performance decrements in anxious situations. Nideffer and Hessler did not attempt to support the belief that anxiety deters musical performance, but investigated the effectiveness of anxiety reduction procedures for those performers who appear to have difficulties in anxious situations. In the studies conducted by Wardle, Wolfe, and Terwilliger, the researchers assumed that anxiety deters a musical performance and proceeded from this premise. Since there is a lack of published research concerning the effects of anxiety in musical performance, this type of approach is perhaps premature and assumptive.

Anxiety and Beta-Blockade Agents

Research has been conducted and published on the use of beta-blockade agents for reduction of anxiety in musical performance. Drugs which have been employed and evaluated for their effectiveness as beta-blockade agents in anxiety reduction research are oxprenolol, alprenolol chloride, and proprandolol. James, Griffith, Pearson, and Newbury (1977), who conducted research using a beta-blockade agent, report the effects of excessive anxiety in musical performance.

> Skill, coordination, and judgment may all be adversely affected. Excessive catecholamine release causes tachycardia and muscle tremor and may further increase anxiety. Infusion of catecholamines or their release from a phaeochromocytoma can cause anxiety. There seems to be a positive feedback of anxiety causing catecholamine release, which causes further anxiety (p. 952).

Liden and Gottfries (1974) reported that in anxious situations ". . . the catecholamine output can be raised to a level which causes violent palpitation and increased muscular tonus with tremor. These effects . . . can be truly incapacitating for musicians" (p. 529). The premise for the following research studies was based on the belief that excessive catecholamine output in anxious situations may cause performance decrements.

Liden and Gottfries (1974) used the beta-blockade agent alprenolol chloride to reduce the catecholamine output in musicians performing in stressful situations. Based on the results of a self-report questionnaire, subjects for the study were selected on the basis of difficulties dealing with the effects of anxiety in performance situations. These subjects were members of a professional symphony orchestra in Sweden. Liden and Gottfries (1974) reported the following conclusion.

> Alprenolol chloride has thus been shown to have a clear-cut ameliorating effect on symptoms caused by catecholamines and severely affecting the performance when playing different instruments (mainly string instruments). Positive effects can be seen also on the "para-symptoms" accompanying the catecholamine release, indicating that these are secondary to the catecholamine-induced symptoms (p. 529).

Liden and Gottfries concluded that the use of the beta-blockade agent alprenolol chloride could reduce anxiety and improve the performances of those musicians who were judged to have catecholamine symptoms of such severity as to deter their performances. It appeared that no attempt was made to determine the effects of anxiety on all musicians in this study. The research was directed toward the use of alprenolol

chloride in reduction of anxiety for those musicians who experienced performance decrements in anxious situations.

A study employing the use of a beta-blockade agent oxprenolol was reported by James, Griffith, Pearson, and Newbury (1977). The purpose of their research was to measure the effect of oxprenolol on stage-fright or the "natural" anxiety of public performance. Twenty-four string players were selected as subjects for the study. The subjects performed début recitals before an invited audience, which included members of the press, radio, and television. Performances were scored by two professional musicians reported to be experienced in adjudicating competitions. Subjects were also directed to self-rate their performances.

Two physiological measures (pulse rate and blood pressure) and a visual analogue rating scale (VARS) were administered to determine anxiety levels. Each subject performed once each day for two days. During the first day 12 doses of oxprenolol and 12 doses of placebo were randomly administered to subjects. On the second day the 12 subjects that received the placebo were administered the oxprenolol and the 12 who received the oxprenolol were administered the placebo. The following conclusion was reported by James et al. (1977).

> The main finding was that oxprenolol caused a significant improvement in overall musical performance. Subjects with lower total scores on placebo seemed to improve most when on the drug. Although overall mean improvement was only about 5%, in some subjects there was 30% improvement. One individual showed a 73% improvement in total score (p. 953).

The researchers reported that oxprenolol had its greatest effect on the first day of performance when anxiety levels were measured as being higher as compared to anxiety levels determined on the second day.

Brantigan, Joseph, and Brantigan (1978, 1979) attempted to assess the effectiveness of a beta-blockade drug (propranolol) in anxiety reduction in musical performance. Organists and pianists served as subjects for the research. Each subject performed once each day for two days before an audience. During the first day subjects received either a placebo or propranolol. Subjects receiving propranolol on the first day were administered placebos on the second and those who took placebos on the first day were administered propranolol on the second. Brantigan et al. (1979) reported: "Heart rate and other manifestations of stage fright were monitored and the quality of performances was evaluated" (p. 20). Although no data were presented in their reports, the researchers concluded that musicians' performances improved with the use of propranolol.

Summary of research on beta-blockade agents. In each of the studies previously discussed, the use of a beta-blockade agent was reported to reduce catecholamine output in subjects and reduce anxiety levels. All researchers reported that performances of subjects improved when administered a beta-blockade agent. Subjects in these studies were selected on the basis of performance experience and/or propensity for performance decrements in anxious situations. Researchers did not attempt to generalize that anxiety reduction improves performance quality for all musicians, but only for those performers who were determined to produce excess catecholamine in anxious situations.

Assessment of Anxiety in Stressful Musical Performance

Published, empirical research in the assessment of anxiety in musical performance is minimal. In a study by Leglar (1975, 1978), the primary objective (as stated) of the research was not intended to investigate the effect of anxiety on performance, but findings in this area were reported. The primary objective of Leglar's research was to determine whether performer anxiety increased with the absence of a musical score and whether anxiety increased in relation to audience calibre and number.

Subjects for Leglar's study were 30 organists. Each subject was required to perform in six different situations: solitary performance with and without a score, performance in the presence of a critic with and without a score, performance in the presence of a critic and professional peers with and without a score. A questionnaire was administered as a subjective measurement of anxiety in each performance condition. Physiological measurements were also employed to assess anxiety levels in the performance situations. A Physiograph and a Datagraph were used for this purpose. Performances were tape-recorded and three adjudicators evaluated subjects' performances for musical quality. Leglar (1978) reported the following results.

> The statistical analysis yielded sufficient evidence to indicate that both the removal of the score and the size of the critical audience were factors which increased anxiety. Further, conditions which produced high anxiety tended to result in poorer performance levels (p. 5202A).

Spencer (1969) investigated the relationship of situational anxiety to vocal performances of students. Fifty-seven male and female college freshmen, registered in their first semester of collegiate voice training, were subjects for the study. Subjects' performances were recorded in two performance situations: in voice lessons and in music jury examinations. The Anxiety Differential was administered to determine situational anxiety levels. Spencer (1969) reported:

> All students total performed significantly better, .001 level, in the jury than in voice lessons. All students total manifested significantly greater anxiety, .001 level, in the jury than in voice lessons (p. 238A).

Spencer also reported that male students, on the average, were better vocal performers as compared with female vocal performers. Spencer (1969) stated: "Students of moderate vocal performance experience were on the average better vocal performers than students of limited vocal performance experience" (p. 238A).

Hamann and Herlong (1979, 1980) conducted a study in which an assessment of anxiety in performances of classical guitarists was investigated. Eighteen classical guitarists served as subjects for the research. The amount of performing experience among the subjects varied from four to fifteen years and the amount of formal classical guitar study ranged from one to five years.

Each subject performed one musical composition in two performance situations: an anxious situation, in which a guitar instructor and peers formed an audience, and a reduced anxiety situations, in which subjects performed in a room with tape-recording equipment present. After each performance, subjects were administered the State-Trait

Anxiety Inventory. Performances were tape-recorded and evaluated by three adjudicators. Hamann and Herlong reported the following results.

1. A significant difference in state anxiety between the anxious and reduced anxiety performance situations was found.

2. No significant interaction between years of nonformal guitar study and performance conditions was found.

3. Although no significant interaction between years of formal classical guitar study and performance conditions was found, it was observed that of the five categories of years of formal study, the subjects with the highest years of study were rated superior in the anxious performance condition as compared to the reduced anxiety condition.

Researchers also reported that subjects with high formal training exhibited larger A-State anxiety score differences, compared with subjects with low formal training, under the two performance conditions.

Summary of assessment of anxiety research in stressful musical performance. In the studies reported above, an assessment of anxiety in musical performance was investigated. Leglar (1978) reported that audience composition and score removal increased anxiety. Spencer (1969) reported increased anxiety in jury performances, compared to voice lesson performances. Hamann and Herlong (1979) reported a significant difference in state anxiety between anxious and reduced anxious conditions. It would appear that score removal, the type and composition of an audience or the situation under which a performance is attempted, can effect the level of anxiety present in a performer.

Spencer reported an increase in anxiety level for vocal students performing in a music jury situation as compared with

performing in a vocal lesson situation. In addition, the researcher stated that subjects performed "significantly better" in the high-anxious situation as compared with the low-anxious situation. Hamann and Herlong observed that high-anxious subjects with high formal training were rated "superior" in the anxious situation. Spencer observed that subjects with higher experience were "better" performers than subjects with lower experience. It would appear that subjects can perform in a superior manner in anxious situations as compared with reduced anxious situations. It would also appear that subjects with higher experience and/or training tend to perform in a superior manner, compared to subjects with less experience and/or training.

Conclusion

Although studies on anxiety and its effects in musical performance have been conducted, there is a need for research in which objective and unbiased assessment of anxiety affects on performers is investigated. The majority of studies on anxiety in musical performance research are based on the premise that anxiety deters musical performance. The extent to which anxiety contributes to positive or negative performance is unknown.

A study of anxiety theories in learning behavior reveals that performance increments and decrements for subjects with varying levels of training and anxiety may be experienced. It would appear that a relationship between anxiety affect on learning behavior and musical performance could exist.

The focus of research in this study was the following hypotheses.

1. There will be no significant ($p < .05$) difference among the STAI mean state anxiety scores of subjects with high, medium, and low trait anxiety as measured by the STAI A-Trait scale.
2. There will be no significant ($p < .05$) difference between the STAI mean state anxiety scores of subjects performing under enhanced and reduced anxiety conditions.
3. There will be no significant ($p < .05$) interaction between STAI trait anxiety scores and performance condition, with trait anxiety of subjects (as measured by the STAI A-Trait scale) as the dependent variable.
4. There will be no significant ($p < .05$) difference among mean performance ratings of subjects with high, medium, and low trait anxiety as measured by the STAI A-Trait scale.
5. There will be no significant ($p < .05$) difference between mean performance ratings of subjects performing under enhanced and reduced anxiety conditions as measured by the STAI.
6. There will be no significant ($p < .05$) interaction between judged performance ratings and performance condition, with trait anxiety of subjects (as

measured by the STAI A-Trait scale) as the dependent variable.

7. There will be no significant ($p < .05$) difference among the STPI mean state anxiety scores of subjects with high, medium, and low trait anxiety as measured by the trait anxiety scale of the STPI.
8. There will be no significant ($p < .05$) difference between the STPI mean state anxiety scores of subjects performing under enhanced and reduced anxiety conditions.
9. There will be no significant ($p < .05$) interaction between STPI trait anxiety scores and performance condition, with trait anxiety of subjects (as measured by the trait anxiety scale of the STPI) as the dependent variable.
10. There will be no significant ($p < .05$) difference among mean performance ratings of subjects with high, medium, and low trait anxiety as measured by the trait anxiety scale of the STPI.
11. There will be no significant ($p < .05$) difference between mean performance ratings of subjects performing under enhanced and reduced anxiety conditions as measured by the STPI.
12. There will be no significant ($p < .05$) interaction between judged performance ratings and performance condition, with trait anxiety of subjects (as

measured by the trait anxiety scale of the STPI) as the dependent variable.

13. There will be no significant ($p < .05$) difference among the STPI mean state curiosity scores of subjects with high, medium, and low trait curiosity as measured by the trait curiosity scale of the STPI.
14. There will be no significant ($p < .05$) difference between the STPI mean state curiosity scores of subjects performing under enhanced and reduced anxiety conditions.
15. There will be no significant ($p < .05$) interaction between STPI trait curiosity scores and performance condition, with trait curiosity of subjects (as measured by the trait curiosity scale of the STPI) as the dependent variable.
16. There will be no significant ($p < .05$) difference among mean performance ratings of subjects with high, medium, and low trait curiosity as measured by the trait curiosity scale of the STPI.
17. There will be no significant ($p < .05$) difference between mean performance ratings of subjects performing under enhanced and reduced anxiety conditions as categorized by trait curiosity scores on the STPI.
18. There will be no significant ($p < .05$) interaction between performance ratings and performance

condition, with trait curiosity of subjects (as measured by the trait curiosity scale of the STPI) as the dependent variable.

19. There will be no significant ($p < .05$) difference among the STPI mean state anger scores of subjects with high, medium, and low trait anger as measured by the trait anger scale of the STPI.
20. There will be no significant ($p < .05$) difference between the STPI mean state anger scores of subjects performing under enhanced and reduced anxiety conditions.
21. There will be no significant ($p < .05$) interaction between STPI trait anger scores and performance condition, with trait anger of subjects (as measured by the trait anger scale of the STPI) as the dependent variable.
22. There will be no significant ($p < .05$) difference among mean performance ratings of subjects with high, medium, and low trait anger as measured by the trait anger scale of the STPI.
23. There will be no significant ($p < .05$) difference between mean performance ratings of subjects performing under enhanced and reduced anxiety conditions as categorized by trait anger scores on the STPI.
24. There will be no significant ($p < .05$) interaction between performance ratings and performance condition,

with trait anger of subjects (as measured by the trait anger scale of the STPI) as the dependent variable.

25. There will be no significant ($p < .05$) difference among the STAI mean state anxiety scores of subjects with high, medium, and low years of formal study on an instrument or voice.
26. There will be no significant ($p < .05$) difference between the STAI mean state anxiety scores of subjects performing under enhanced and reduced anxiety conditions as categorized by years of formal study on an instrument or voice.
27. There will be no significant ($p < .05$) interaction between STAI trait anxiety scores and performance condition, with years of formal study on an instrument or voice as the dependent variable.
28. Years of formal study and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality.
29. Years of nonformal study and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality.
30. Years of ensemble experience and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality.

31. Subjects' solo experience self-rating and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality.
32. Subjects' solo-ensemble experience self-rating on another instrument and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality.
33. Subjects' principal instrument (performance area) and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality.
34. Subjects' accompaniment on nonaccompaniment and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality.
35. Subjects' confidence with accompaniment and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality.
36. Subjects' performance of a work previously and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality.
37. Performance of music with and without score(s) and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality.

38. Subjects' confidence performing from memory or from score(s) and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality.
39. Subjects' use or nonuse of medication during performance and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality.
40. Subjects' mental readiness self-rating and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality.
41. Subjects' technical readiness self-rating and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality.
42. Subjects' sex and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality.

CHAPTER III

PROCEDURE

The purpose of this study was to investigate the effects of anxiety in musical performance. Subjects, in one of six instrumental/vocal areas (piano, bowed string, woodwind, brass, voice, and guitar), performed one composition of their choice in two performance situations; an enhanced anxiety and a reduced anxiety condition. All performances were recorded. An adjudicator performance-rating instrument was used by judges to evaluate recorded performances for musical quality. Two self-report inventories were administered to determine state and trait anxiety, curiosity, and anger under both performance conditions. A questionnaire developed by the researcher was administered to collect additional data. Analyses of data were based on results from the questionnaire, adjudicator-rated performances, and the self-report inventories.

Materials and Equipment

A JVC, model KD-1636-2J, portable stereo cassette tape-recording deck with a Realistic "electret" condenser stereo microphone was employed to tape-record subjects' performances. Maxell UDXL II cassette, sound-recording tape was used with the JVC tape deck for all recordings.

Two stereo, reel-to-reel tape-recording decks; a Teac, model 4010s, and a Toshiba, model 2200, equipped with Maxell UD 35-90

reel-to-reel sound-recording tape were used to rerecord taped performances for adjudicator evaluation purposes.

Adjudicator Performance Rating Forms

An adjudicator performance-rating instrument (See Appendix A), developed by the researcher, was used to evaluate performances. (See Appendix B for established reliability data.) Established item evaluation categories, with a Likert scale of 1 (Excellent) to 5 (Fair) for each category, were used by adjudicators to evaluate instrumental/vocal performance areas. There were six performance areas; piano, bowed string, woodwind, brass, voice, and guitar. The following categories were used to evaluate performances of guitarists and pianists: Rhythmic Accuracy, Technical Competence, Phrasing, Expressiveness/ Musicianship, Tone Quality, and Total Performance. In addition to the six categories used to evaluate guitarists and pianists, Intonation was added to rating sheet categories for the evaluation of brass, bowed string, woodwind, and vocal performers. Since guitar and piano are often considered "fixed" or "pre-tuned" instruments, intonation was not evaluated in these recorded performances. Therefore, total scores from any one judge for guitar and piano performances could have ranged from a minimum of six points to a maximum of 30 points, while total scores from any one judge on vocal, brass, woodwind, or bowed string performances (with the intonation category) could have ranged from a minimum of seven points to a maximum of 35 points.

Questionnaire

A questionnaire, developed and pilot tested by the researcher, was used to collect additional information (See Appendix C). Sixteen questions were listed for subject response. Subjects reported years of formal and nonformal study and years of ensemble experience in their performance area. Using a Likert scale of 1 (Limited) to 5 (Considerable), subjects rated the amount of solo performance experience on their principal instrument and solo-ensemble performance experience on other instruments.

In the enhanced and reduced anxiety situations, subjects were recorded performing one composition of their choice. Each subject reported whether the composition, chosen for performance in the enhanced and reduced anxiety situations, was performed from memory or music. Six questions concerning performance aspects of the condition and/or the composition chosen, in which subjects responded either yes or no, were also administered. The questions were as follows: "Will you be accompanied during your performance?" "If accompanied, do you feel comfortable/confident with your accompanist?" "Have you performed this composition for an audience previously?" "If from memory, do you feel confident performing this work from memory?" "If from music, do you feel confident performing this work from music?" and "Will you be on any medication during performances?" Two questions in which subjects indicated levels of preparedness concerning chosen compositions were administered. A Likert scale of 1 (Insecure) to 5 (Confident) was used for this purpose and subjects' self-rated their mental and technical readiness to perform their compositions in front of an audience.

Anxiety Inventories

The State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Lushene, 1970) was employed to assess anxiety levels in performance situations. The A-State scale and the A-Trait scale of this measure were used for anxiety measurement.

The State-Trait Personality Inventory (STPI) (Spielberger, Barker, Knight, Marks, Russell, Silva De Crane, & Westberry, 1979) was employed to assess anxiety, curiosity, and anger levels in performance situations. The A-State scale and the A-Trait scale of this measure were employed for this purpose.

Subjects

Ninety music students, five graduates and 85 undergraduates, studying privately at the University of North Carolina at Greensboro served as subjects. There were 42 male and 48 female subjects.

Selection Criteria

Instructors in performance areas solicited their students to perform prepared compositions in respective repertory classes. When students were identified and associated with a specific repertory class, the researcher asked those students, prior to either repertory or nonrepertory performances, whether they would be willing to participate in the research study. If students volunteered as subjects, they were recorded in a repertory and nonrepertory performance situation. Only subjects who were able to perform and record a musical composition in two performance situations, within a five-day span, were selected

for the study. If any subject was unable to perform within this time span, data that were collected from one of the prior performance recording situations were deleted from the study and another subject was selected. Therefore, criteria for selection were based on each subject's ability and willingness to perform and record a musical composition in the two performance situations with a five-day span.

Subsequent to the selection process, six homogenous groups--piano, guitar, vocal, bowed string, brass, and woodwind--were formed. There were fifteen subjects in each of the six groups. Subjects were assigned to a group on the basis of their major or principal performance area. There was no attempt to assess subjects' training or performance experience prior to selection for the study or for group placement.

Testing Procedures

Each subject performed one musical composition of his/her choice under two performance conditions. The performance conditions were an enhanced anxiety condition (repertory class) where an instructor and peers formed an audience, and a reduced anxiety condition (as supported by previous research) where subjects performed in a room with only tape-recording equipment present (nonrepertory). Performances were not ordered, but were recorded at each subject's convenience. After repertory class performances, subjects were administered the A-Trait and the A-State scales of the STAI and the STPI. Subjects were administered the A-Trait and the A-State scales of the STAI and the STPI, in addition to the questionnaire, after the

nonrepertory performance. Subjects were instructed to respond to the A-State scale of the STAI and STPI with the directive: "Indicate how you felt while you were performing." Subjects were instructed to respond to the A-Trait scale of the STAI and STPI with the directive: "Indicate how you generally feel." The same directives were used in both repertory and nonrepertory performance situations.

Subjects were tape-recorded in both performance situations and were not aware of the purpose of the recording sessions. Although the instructors of the repertory classes were informed of the nature of the study, they were instructed not to so apprise subjects. Subjects were not allowed an interval longer than five days to perform and record under the two performance conditions. Subjects were instructed not to "practice" a composition, once it had been recorded in one situation, until it had been recorded and performed under both conditions. The five-day span and "practice" restriction was initiated to control for any improvement factor in performances.

Adjudication

Recorded performances were rerecorded (from cassette tape to reel-to-reel tape), for adjudicator-rating purposes, for the following reasons:

1. To group performances (two) of a subject that may have been randomly recorded on a cassette tape (to establish a "set").
2. To randomize the order of performances within a "set."
3. To limit performance length.
4. To insert verbal announcements of performance numbers and letters.

Recorded performances of any one subject may have been randomly placed on any cassette tape during data collection. In order that two performances of any one subject could be evaluated sequentially, performances were rerecorded on reel-to-reel sound-recording tape. Any two sequentially ordered performances of a subject were referred to as a "set." A "set" consisted of two performances of one subject as recorded under repertory class and nonrepertory conditions. For each subject, the order of performances (repertory and nonrepertory) was randomized within a "set" on tapes presented to adjudicators. For example, a subject (identified on a judge's rating sheet as #21) performed twice. The order in which the performances in the "set" were presented (repertory or nonrepertory) was randomized. Therefore, performance 21a could have been a repertory performance and 21b a nonrepertory performance, or 21a could have been a nonrepertory performance and 21b a repertory performance of subject #21.

When rerecording for judges, each performance was limited to a maximum of two minutes. If a musical composition was longer than the specified time, it was "faded out" at the termination of two minutes. This was done to limit adjudicator listening time and to establish a standardized performance frame.

On the tapes presented to judges, performance numbers and letters were announced before a performance was heard. The announcements corresponded to the order in which performances were rated and were numbered and lettered on adjudicator forms. For example, an announcement was made that performance 21a was to be presented. The adjudicator was then aware that the form labeled 21a was to be employed

for rating purposes. Once performance 21a was completed, an announcement was made that performance 21b was to be presented. The adjudicator was then aware that the form labeled 21b was to be employed for rating purposes.

Three judges were employed for evaluating the recordings of performances for musical quality. Three musicians, two Assistant Professors (in the area of applied cello and piano) in the School of Music at the University of North Carolina at Chapel Hill and one former Instructor (in the area of applied piano) in the School of Music at the University of North Carolina at Greensboro, served as adjudicators. The judges were unaware of the nature of the study and the conditions under which performances were recorded. Judges used adjudicator performance-rating forms developed by the researcher to evaluate performances (See Appendix A). Judges were instructed to evaluate each performance in the context of their "ideal" performance concept for a particular instrument or voice. Adjudicators were instructed not to compare performances within a set; judges evaluated one performance of a set before presentation of a second performance for evaluation.

The recorded order of the performances was the same for each judge and the judging was done independently. Adjudicator performance rating forms were numbered and lettered in the same way for all judges.

Analyses of Data

Analyses of data were based on results from the questionnaire, adjudicator rated performances, and the STAI and STPI. A quotient of agreement statistic and Pearson product-moment correlation coefficients

were computed on performance rating scores (from the adjudicator rating forms) to determine reliability and inter-judge reliability.

Eight two-way analyses of variance (ANOVA) split-plot designs with equal subgroups, one two-way ANOVA split-plot design with unequal subgroups, and 15 chi-square analyses were used to analyze data.

For the ANOVA, subjects' data were grouped into three categories according to mean repertory and nonrepertory A-Trait anxiety scores obtained from the STAI. The three categories were: Low, Medium, and High. The category groupings were based on percentile ranks for male and female college students reported in Spielberger et al., Manual for the State-Trait Anxiety Inventory (1970, p. 7). Subjects' data were also grouped into three categories according to mean A-Trait anxiety, curiosity, and anger scores obtained from the STPI. The three categories were Low, Medium, and High. The category groupings were based on percentile ranks for male and female college students, reported in Spielberger et al., Preliminary Manual for the State-Trait Personality Inventory (1979, unnumbered).

Groupings for subjects' data (male and female) from both the STAI and STPI were established by placing the "upper" one-third percentile ranked students in the High categories, the "middle" one-third in the Medium categories, and the "bottom" one-third in the Low categories.

Eight two-way ANOVA with split-plot designs using equal-sized subgroups, were computed as follows:

1. A-State anxiety scores on the STAI (dependent variable) with A-Trait anxiety scores on the STAI (averaged between enhanced anxiety performance condition and reduced anxiety performance condition); and performance condition (independent variables).

2. Judges performance scores averaged across judges (dependent variable), with A-Trait anxiety scores on the STAI (averaged); and performance condition (independent variables).

3. A-State anxiety scores on the STPI (dependent variable) with A-Trait anxiety scores on the STPI (averaged); and performance condition (independent variables).

4. Judges performance scores averaged (dependent variable), with A-Trait curiosity scores on the STPI (averaged); and performance condition (independent variables).

5. A-State curiosity scores on the STPI (dependent variable) with A-Trait curiosity scores on the STPI (averaged); and performance condition (independent variables).

6. Judges performance scores averaged (dependent variable), with A-Trait curiosity scores on the STPI (averaged); and performance condition (independent variables).

7. A-State anger scores on the STPI (dependent variable), with A-Trait anger scores on the STPI (averaged); and performance condition (independent variables).

8. Judges performance scores averaged (dependent variable), with A-Trait anger scores on the STPI (averaged); and performance condition (independent variables).

One two-way ANOVA with a split-plot design using unequal-sized subgroups was completed as follows:

1. A-State anxiety scores on the STAI (dependent variable) with years of formal study and performance condition (independent variables).

Fifteen chi-square analyses were computed. Data were divided into three groups based on subjects' years of formal study, years of ensemble experience, and years of nonformal study for three chi-square analyses. The three groupings for years of formal study were 11

through 15 years (group one), 6 through 10 years (group two), 1 through 5 years (group three). For years of ensemble experience, the groupings were 11 through 16 years (group one), 5 through 10 years (group two), and 0 through 4 years (group three). Data for subjects with 10 through 15 years of nonformal study were placed in group one; with 5 through 9 years, group two; and with 0 through 4 years, group three.

All other groupings for chi-square analyses were based on questionnaire responses. For example, when subjects responded to a Likert scale of one to five and indicated "one," data were placed in group one for that particular chi-square analysis (See Appendix C for questionnaire responses).

Following are descriptions of chi-square analyses, with one degree of freedom:

1. Subjects accompanied or not accompanied in performances, with performance rated "superior," (repertory class, enhanced anxiety condition; or nonrepertory, reduced anxiety condition), as determined by the judges' total scores.

2. Subjects' performance of compositions for audiences previously with performance rated "superior."

3. Subjects' performance of compositions from memory or music with performance rated "superior."

4. Subjects' confidence performing compositions from memory or music with performance rated "superior."

5. Subjects' performances, while subjects under the influence or noninfluence of medication, with performance rated "superior."

6. Subjects' sex with performance rated "superior."

Following are descriptions of chi-square analyses, with two degrees of freedom:

1. Subjects' years of formal study, grouped as previously stated, with performance rated "superior."

2. Subjects' years of ensemble experience, grouped, with performance rated "superior."

3. Subjects' years of nonformal study, grouped, with performance rated "superior."

4. Subjects' confidence with accompanist, if accompanied, with performance rated "superior."

One chi-square analysis, with three degrees of freedom, was as follows:

1. Subjects' self-ratings of technical readiness to perform compositions, recorded for the research study, with performance rated "superior."

Following are descriptions of chi-square analyses, with four degrees of freedom:

1. Subjects' self-ratings of solo performing experience, on the instruments or voice recorded for the research study, with performance rated "superior."

2. Subjects' mental readiness to perform compositions, recorded for the research study, with performance rated "superior."

Two chi-square analyses, with five degrees of freedom, were as follows:

1. Subjects' self-ratings of solo and ensemble experience on instruments (voice) other than those recorded for the research study, with performance rated "superior."

2. Subjects' instruments performed on for the research study, grouped, with performance rated "superior."

CHAPTER IV

RESULTS

Judge's individual scores for each performance were summed and recorded. In order to determine which performance (repertory, enhanced anxiety condition; or nonrepertory, reduced anxiety condition) was judged to be "superior," the point ratings for each performance, for all judges, were totaled. Based on the total score of the three judges, the performance with the lowest total point score was determined to be the "best" of the two performances for each subject. For example, performer number one's repertory performance was scored 64 and the nonrepertory performance was scored 70. The repertory performance was determined to be the "better" of the two performances based on the three-judge point total. In order to estimate inter-judge reliability, quotients of agreements and Pearson product-moment correlation coefficients were computed on performance-rating scores (from the adjudicator-rating forms).

Pearson product-moment correlation coefficients were computed on the trait and state scales of the State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Lushene, 1970) and on the trait and state anxiety, curiosity, and anger scales of the State-Trait Personality Inventory (STPI) (Spielberger, Barker, Knight, Marks, Russell, Silva De Crane, & Westberry, 1979). Since the scores on the trait scales of the STAI and STPI are expected to remain constant while scores on the state scales of the STAI and STPI are expected to vary

according to the conditions of the situations, the trait correlations should remain "high" while state correlations should be lower if the conditions of the situations varied for subjects.

Quotients of Agreements and Judges' Scores

A quotient of agreement statistic was computed on the basis of results of the total-judge score rating. This statistic was computed using the formula: agreements (agreements being determined as the number of judges who rated the repertory or nonrepertory performances in the same order as the total-judge score rating indicated), divided by agreements plus disagreements. The result of this computation indicated a .674 quotient of agreement. The maximum number of total agreements that could have been obtained from the performances rated by the three judges was 270, of which there were 192 actual agreements.

The quotient of agreement statistic was also computed between pairs of judges. Agreements between judges could have totaled a maximum of 90. The agreements and quotients of agreement between judges are as follows:

1. Between judge one and judge two: 68 agreements; .76 quotient of agreement.
2. Between judge two and judge three: 58 agreements; .64 quotient of agreement.
3. Between judge one and judge three: 56 agreements; .62 quotient of agreement.

Pearson Product-Moment Correlation Coefficients and Judges' Scores

Pearson product-moment correlation coefficients were computed to determine inter-judge reliabilities. The following correlations were computed between judges' total scores (repertory plus nonrepertory scores).

1. Between judge one and judge two. $r = .92$.
2. Between judge two and judge three, $r = .51$.
3. Between judge one and judge three, $r = .45$.

The mean correlation between judges was computed by converting each Pearson product-moment correlation coefficient to a Fisher's z-transformation statistic, averaging the Fisher z's, and then by converting to the Pearson product-moment correlation coefficient. The mean correlation between judges was computed to be $r = .70$.

Pearson Product-Moment Correlation Coefficients Computed on the STAI and STPI

The Pearson product-moment correlation coefficient, computed between repertory and nonrepertory STAI trait anxiety scores of subjects, was $r = .92$. The computed correlation coefficient for repertory and nonrepertory state anxiety scores, on the STAI, was $r = .40$. The extent of relationship between trait anxiety scores and state anxiety scores may have been reflected in the relatively consistent trait scores of subjects in both performance situations and inconsistent state scores in the same situations. According to

Spielberger (1970), trait anxiety scores should remain constant while state anxiety scores may vary from one situation to another, depending on the degree of anxiety present for subjects in those situations.

The Pearson product-moment correlation coefficients computed between repertory and nonrepertory STPI state and trait anxiety, curiosity, and anger scores of subjects were as follows:

1. Between repertory and nonrepertory anxiety trait scores on the STPI, $r = .95$.
2. Between repertory and nonrepertory anxiety state scores, $r = .86$.
3. Between repertory and nonrepertory curiosity trait scores, $r = .96$.
4. Between repertory and nonrepertory curiosity state scores, $r = .91$.
5. Between repertory and nonrepertory anger trait scores, $r = .91$.
6. Between repertory and nonrepertory anger state scores, $r = .75$.

The trait correlation coefficients for subjects' scores on anxiety, curiosity, and anger were higher than those of the state scores. There was not as much difference (across situations) in subjects' trait scores, compared to state scores. Therefore, the resulting trait correlation coefficients might have been expected to be higher than those for the state scores. There was a greater difference in subjects' state anxiety and anger scores than in their curiosity state scores. This may also be reflected in the state correlation coefficients obtained for these measures.

Analyses of Variance

Eight two-way analyses of variance, split-plot designs with equal-sized subgroups, were computed as follows:

1. State anxiety scores on the STAI (dependent variable) with trait anxiety scores on the STAI and performance condition (independent variables).

2. Judges performance scores (dependent variable) with trait anxiety scores on the STAI and performance condition (independent variables).

3. State anxiety scores on the STPI (dependent variable) with trait anxiety scores on the STPI and performance condition (independent variables).

4. Judges performance scores (dependent variable) with trait curiosity scores on the STPI and performance condition (independent variables).

5. State curiosity scores on the STPI (dependent variable) with trait curiosity scores on the STPI and performance condition (independent variables).

6. Judges performance scores (dependent variable) with trait curiosity scores on the STPI and performance condition (independent variables).

7. State anger scores on the STPI (dependent variable) with trait anger scores on the STPI and performance condition (independent variables).

8. Judges performance scores (dependent variable) with trait anger scores on the STPI and performance condition (independent variables).

One two-way analysis of variance (ANOVA), split-plot design with unequal-sized subgroups was computed on A-State anxiety scores on

the STAI (dependent variable) with years of formal study and performance condition (independent variables).

The following factors in the two-way analyses of variances were found to be significant:

1. A significant effect of STAI A-Trait anxiety scores on STAI A-State anxiety scores, $F = 12.63$, $p < .05$ (See Table 1).

2. A significant effect of treatment (anxiety condition) on STAI A-State anxiety scores, $F = 207.22$, $p < .05$ (See Table 1).

3. A significant effect of STPI A-Trait anxiety scores on STPI A-State anxiety scores, $F = 11.86$, $p < .05$ (See Table 3).

4. A significant effect of treatment on STPI A-State anxiety scores, $F = 154.27$, $p < .05$ (See Table 3).

5. A significant effect of STPI A-Trait curiosity scores on STPI A-State curiosity scores, $F = 9.45$, $p < .05$ (See Table 5).

6. A significant effect of treatment on STPI A-State anger scores, $F = 19.51$, $p < .05$ (See Table 7).

7. A significant effect of years of formal study on STAI A-State anxiety scores, $F = 116.18$, $p < .05$ (See Table 9).

No other factors in the two-way ANOVA were significant at the .05 level.

In Tables 1 and 2, 90 subjects were grouped into three categories according to STAI A-Trait anxiety scores: High, Medium, and Low. Groupings for categories were based on STAI percentile ranks for college undergraduates reported in the Manual for the State-Trait Anxiety Inventory (Spielberger et al., 1970). Subjects in the "upper" one-third of percentile ranks were placed in the High category.

Table 1

ANOVA: STAI

Dependent Variable: STAI State Scores

Source	Degrees of Freedom	Mean Square	F
Trait anxiety	2	1371.04	12.63*
Subjects within groups	87	108.6	
Treatment	1	9592.2	207.22*
Trait anxiety x Treatment	2	15.82	.34
Treatment x Subjects within groups	87	46.29	

*$p < .05$

Table 2

ANOVA: STAI

Dependent Variable: Judges' Scores

Source	Degrees of Freedom	Mean Square	F
Trait anxiety	2	37.66	.90
Subjects within groups	87	41.67	
Treatment	1	.02	.00
Trait anxiety x Treatment	2	4.75	1.28
Treatment x Subjects within groups	87	3.71	

Subjects in the "middle" one-third and in the "lower" one-third of percentile ranks were placed in the Medium and Low categories, respectively. There were were 14 male and 16 female subjects in the High Trait anxiety category, 16 male and 14 female subjects in the Medium

Trait anxiety category, and 12 male and 18 female subjects in the Low Trait anxiety category. (See Appendix D for category groupings according to performance area.) There were 30 subjects in each category.

Since a significant effect of STAI A-Trait anxiety scores upon STAI A-State anxiety scores was found (See Table 1), a-posteriori comparisons were made among STAI state anxeity means using Tukey's studentized-range statistics for split-plot designs with equal subgroups. The comparison of $\bar{A}_1$ (High Trait category) with $\bar{A}_2$ (Medium Trait category) was significant, $q = 4.13$, $_{.95}q_{3,87} = 3.38$. The comparison of $\bar{A}_1$ with $\bar{A}_3$ (Low Trait category) was significant, $q = 7.07$, $_{.95}q_{3,87} = 3.38$. The comparison of $\bar{A}_2$ with $\bar{A}_3$ was not significant.

In Tables 3 and 4, 78 subjects were grouped into categories according to STPI A-Trait anxiety scores: High, Medium, and Low. The STPI trait anxiety percentile ranks, for college students reported in the Preliminary Manual for the State-Trait Personality Inventory (Spielberger et al., 1979), were used to group subjects into categories. Subjects in the "upper" one-third, "middle" one-third, and "lower" one-third percentile ranks were placed in the High, Medium, and Low trait anxiety categories, respectively. There were 26 subjects in each category: 9 male and 17 female subjects in the High category, 11 male and 15 female subjects in the Medium category, and 10 male and 16 female subjects in the Low category. (See Table 15, Appendix D for category groupings according to performance area.)

Table 3

ANOVA: STPI--Anxiety

Dependent Variable: STPI State Anxiety Scores

Source	Degrees of Freedom	Mean Square	F
Trait anxiety	2	350.83	11.86*
Subjects within groups	75	29.59	
Treatment	1	1800.64	154.27*
Trait anxiety x Treatment	2	30.97	2.65
Treatment x Subjects within groups	75	11.67	

*$p < .05$

Table 4

ANOVA: STPI--Anxiety

Dependent Variable: Judges' Scores

Source	Degrees of Freedom	Mean Square	F
Trait anxiety	2	41.19	1.0
Subjects within groups	75	41.21	
Treatment	1	9.06	2.71
Trait anxiety x Treatment	2	2.18	.65
Treatment x Subjects within groups	75	3.34	

In Table 3, a significant effect of STPI A-Trait anxiety scores upon STPI A-State anxiety scores was found. A-posteriori comparisons, among STPI state anxiety means, were made using Tukey's studentized-range statistic. The comparisons of $\overline{A}_1$ (High Trait anxiety category)

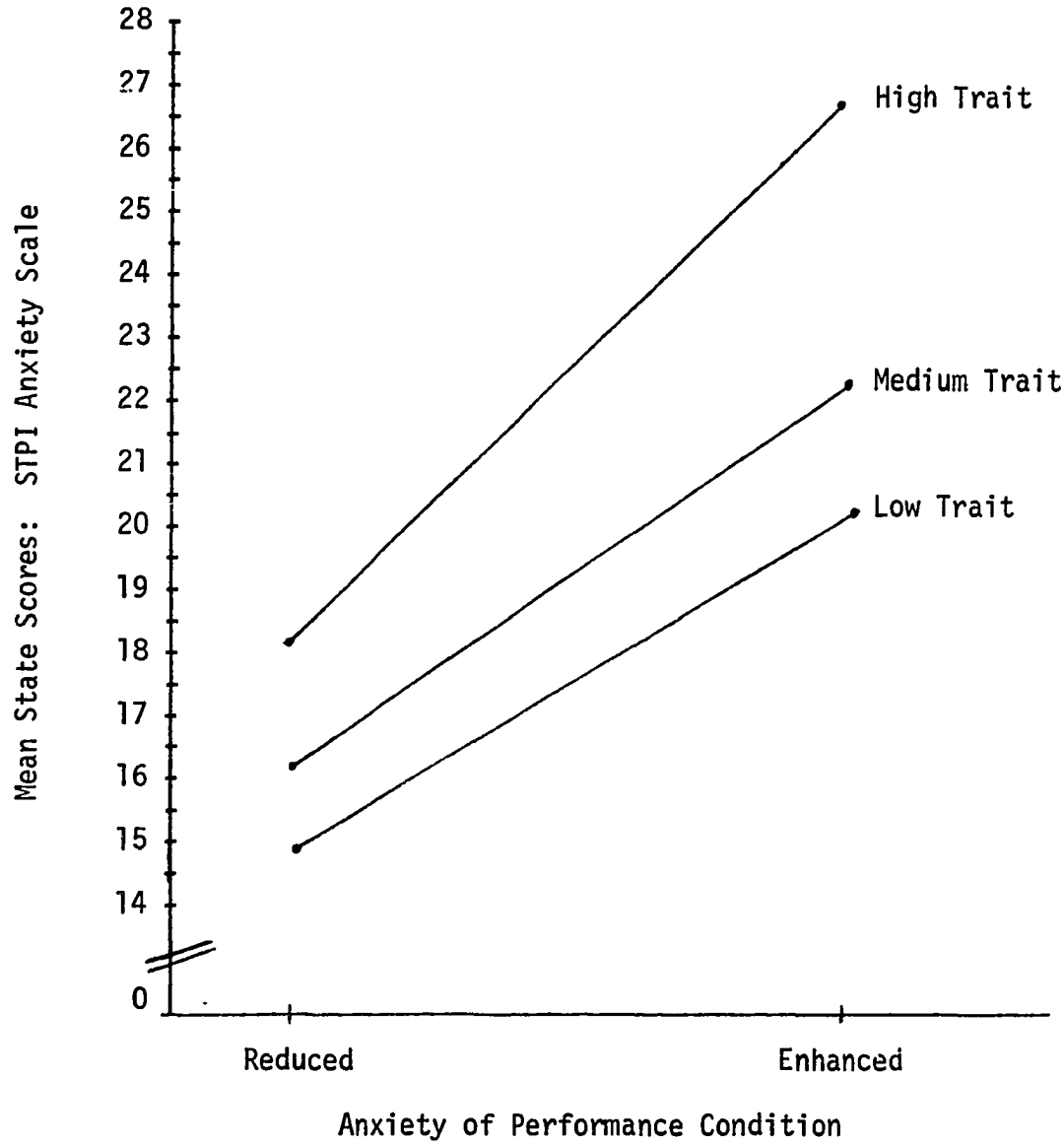
with $\overline{A}_2$ (Medium Trait anxiety category), q = 4.49, and $\overline{A}_1$ with $\overline{A}_3$ (Low Trait anxiety category), q = 6.49, were significant, $_{.95}q_{3,75} = 3.39$. The comparison of $\overline{A}_2$ with $\overline{A}_3$ was not significant.

In Figure 5, the mean STPI state anxiety scores are shown with performance condition (See also; Table 3). Although no significant statistical interaction at the .05 level was found between STPI trait anxiety and treatment, an analysis of Figure 5 reveals the relationship among High, Medium, and Low trait categories. There was a "tendency" toward interaction among variables. There were 26 subjects in each category: High, Medium, and Low.

Subjects were grouped according to STPI trait curiosity scores in Tables 5 and 6. There were 78 subjects in the three categories; 26 subjects in each of the High, Medium, and Low STPI Trait curiosity groupings. Based on trait curiosity percentile ranks for college students, reported in the Preliminary Manual for the State-Trait Personality Inventory (Spielberger et al., 1979), subjects were placed in one of the three trait categories. Subjects in the "upper" one-third, "middle" one-third, and "lower" one-third percentile ranks were placed in the High, Medium, and Low trait curiosity categories, respectively. There were, in the High Trait curiosity category, 7 males and 19 females; in the Medium category, 12 males and 14 females; and 11 males and 15 females in the Low category. (See Table 16, Appendix D for category groupings according to performance area.)

Figure 5

Mean STPI State Anxiety Scores



A significant effect of STPI A-Trait curiosity scores upon A-State curiosity scores was found and a-posteriori comparisons were made using Tukey's studentized-range statistic. No significant difference was found between $\bar{A}_2$ (Medium Trait curiosity category) with

$\overline{A}_3$ (Low Trait curiosity category), but a significant difference was found between $\overline{A}_1$ (High Trait curiosity category) and $\overline{A}_2$, $q = 4.49$, and between $\overline{A}_1$ and $\overline{A}_3$, $q = 6.50$, $_{.95}q_{3,75} = 3.39$ (See Table 5).

Table 5

ANOVA: STPI--Curiosity

Dependent Variable: STPI State Curiosity Scores

Source	Degrees of Freedom	Mean Square	F
Trait curiosity	2	260.95	9.45*
Subjects within groups	75	27.62	
Treatment	1	1.26	.12
Trait curiosity x Treatment	2	6.33	.60
Treatment x Subjects within groups	75	10.53	

*$p < .05$

Table 6

ANOVA: STPI--Curiosity

Dependent Variable: Judges; Scores

Source	Degrees of Freedom	Mean Square	F
Trait curiosity	2	21.40	.52
Subjects within groups	75	41.33	
Treatment	1	5.81	1.50
Trait curiosity x Treatment	2	2.21	.57
Treatment x Subjects within groups	75	3.86	

In Tables 1, 3, 7, and 9 the following significant effects of treatment on years of formal study were found on the following:

1. A significant effect of treatment (anxiety condition) on STAI A-State anxiety scores, $F = 207.22$, $p < .05$ (See Table 1).

2. A significant effect of treatment on STPI A-State anxiety scores, $F = 154.27$, $p < .05$ (See Table 3).

3. A significant effect of treatment on STPI A-State anger scores, $F = 19.51$, $p < .05$ (See Table 7).

4. A significant effect of formal study on STAI A-State anxiety scores, $F = 116.18$, $p < .05$ (See Table 9).

Table 7

ANOVA: STPI--Anger

Dependent Variable: STPI State Anger Scores

Source	Degrees of Freedom	Mean Square	F
Trait anger	2	78.51	3.04
Subjects within groups	75	25.86	
Treatment	1	272.03	19.51*
Trait anger x Treatment	2	19.08	1.37
Treatment x Subjects within groups	75	13.94	

*$p < .05$

Groupings of subjects for Tables 7 and 8 were based upon trait anger percentile ranks, for college students, from the Preliminary Manual for the State-Trait Personality Inventory (Spielberger et al., 1979). Subjects in the "upper" one-third, "middle" one-third, and

"lower" one-third percentile ranks were placed in the High, Medium, and Low trait anger categories, respectively. There was a total of 78 subjects, with 26 subjects in each of the following three categories: High Trait anger category (14 males, 12 females); Medium Trait anger category (8 males, 18 females); and Low Trait anger category (8 males, 18 females). (See Table 17, Appendix D for category groupings according to performance area.)

Table 8

ANOVA: STPI--Anger

Dependent Variable: Judges' Scores

Source	Degrees of Freedom	Mean Square	F
Trait anger	2	40.40	.98
Subjects within groups	75	41.18	
Treatment	1	10.62	3.18
Trait anger x Treatment	2	.18	.05
Treatment x Subjects with groups	75	3.34	

In Table 9, subjects were grouped according to formal years of study. There was a total of 90 subjects, with unequal numbers of subjects in each of three categories. In the High formal years of study category, there were 8 male and 2 female subjects. In the Medium formal years of study category, there were 8 male and 21 female subjects and 32 male and 19 female subjects in the Low formal years of study category. There was a total of 10 subjects in the High category, 29 subjects in the Medium category, and 51 subjects in the Low category.

Table 9

ANOVA: Formal Study

Dependent Variable: STAI State Scores

Source	Degrees of Freedom	Mean Square	F
Formal study	2	295.89	2.98
Subjects within groups	87	99.31	
Treatment	1	9446.75	116.18*
Formal study x Treatment	2	44.1	.54
Treatment x Subjects within groups	87	81.31	

*$p < .05$

Chi-Square Analyses

Fifteen chi-square analyses were completed using data collected from questionnaire results. In Table 10, questionnaire indexes by the variable performance rated "superior" (repertory or nonrepertory performance) are listed. The following indexes, by performance rated "superior," were found to be significant at the .05 level.

1. Subjects' years of formal study.
2. Subjects' principal performance area (instrument or voice).
3. Subjects' sex.

In each of the chi-square analysis, 90 subjects' data were used.

In fifteen chi-square analyses, each tested at the .05 level of significance, we would expect to see .75 significant results, merely by chance if the null hypothesis were true in all cases. A finding of three significant variables thus exceeds this "chance" result by a substantial amount.

Table 10

Chi-Square Statistics for Questionnaire Indexes of Subjects' Training and Performance Readiness by Performance Rated "Superior"

Indexes	Degrees of Freedom	Chi-Square
Years of formal study	2	6.08*
Years of ensemble experience	2	2.51
Years of nonformal study	2	4.18
Solo experience, self-rating	4	3.23
Solo-ensemble experience on another instrument or voice, self-rating	5	4.01
Performance area (Instrument or Voice)	5	16.21*
Subjects accompanied or not accompanied	1	1.91
Subjects' confidence with accompanist	2	2.79
Subjects' performance of compositions previously for audiences	1	.08
Performance of compositions from memory or music	1	1.14
Subjects' confidence performing from memory or music	1	.02
Subjects under influence of medication during performances	1	.13
Subjects' mental readiness to perform compositions	4	1.94
Subjects' technical readiness to perform compositions	3	2.00
Subjects' sex	1	6.09*

*$p < .05$

In the chi-square analysis, years of formal study by performance rated superior, subjects were divided into three categories: High, Medium, or Low formal years of training. Subjects were placed in the repertory or nonrepertory column on the basis of judges' scores, i.e., either the repertory or nonrepertory performance was chosen to be "superior." There was one subject in the High, nonrepertory category;

nine subjects in the High, repertory category; 11 subjects in the Medium, nonrepertory category; 18 subjects in the Medium, repertory category; 26 subjects in the Low, nonrepertory category; and 25 subjects in the Low, repertory category.

There was a total of 38 subjects in the nonrepertory column, which indicated that 38 subjects had their nonrepertory performance judged as "superior" to their repertory performance, and 52 subjects in the repertory category.

Subjects were divided into six categories, according to performance area, in the chi-square analysis; subjects' performance area by performance rated superior. Subjects were placed in nonrepertory or repertory columns according to judges' ratings. There were five subjects in the woodwind, nonrepertory category; ten subjects in the woodwind, repertory category; eight subjects in the brass, nonrepertory category; seven subjects in the brass, repertory category; three subjects in the bowed string, nonrepertory category; 12 subjects in the bowed string, repertory category; 12 subjects in the guitar, nonrepertory category; three subjects in the guitar, repertory category; seven subjects in the voice, nonrepertory category; eight subjects in the voice, repertory category; three subjects in the piano, nonrepertory category; and 12 subjects in the piano, repertory category. There was a total of 38 subjects in the nonrepertory column and 52 subjects in the repertory column.

In Table 18 (See Appendix D), performance areas were divided into three categories based on years of formal training. The categories were: High, Medium, and Low years of formal training.

In the chi-square analysis, subjects' sex by performance rated superior, subjects were placed in one of two categories according to their sex, and in the nonrepertory or repertory column according to their judged performances.

There was a total of 42 male and 48 female subjects. In the nonrepertory column were 24 male and 14 female subjects, and in the repertory column there were 18 male and 34 female subjects. A total of 52 subjects had their repertory performances chosen as "superior" and a total of 38 subjects had their nonrepertory performances chosen "superior."

In Table 19 (See Appendix D), subjects were placed in one of three categories according to years of formal study: High, Medium, or Low. Column groupings were by subjects' sex.

CHAPTER V

CONCLUSIONS

There may be many factors that affect a musician's performance. One factor, that musicians tend to agree is present in performance, is performer anxiety. Anxiety can be defined as a physical and/or mental deviation from a "normal state." The degree of, and the response to anxiety in performance can vary among performers. In general, it is believed that anxiety can enhance or impede a musician's performance. There is minimal published research in the assessment of anxiety in musical performance to support either contention.

The purpose of this study was to measure response to anxiety and assess the judged musical quality of subjects' performances in enhanced and reduced anxiety performance situations. The basic research question investigated was whether anxiety improves or diminishes the judged quality of a performance.

Hypotheses

From the results of the analyses, the following hypotheses were rejected.

1. There will be no significant ($p < .05$) difference among the STAI mean state anxiety scores of subjects with high, medium, and low trait anxiety as measured by the STAI A-Trait (See Table 1, p. 65).

2. There will be no significant ($p < .05$) difference between the STAI mean state anxiety scores of subjects performing under enhanced and reduced anxiety conditions (See Table 1, p. 65).
3. There will be no significant ($p < .05$) difference among the STPI mean state anxiety scores of subjects with high, medium, and low trait anxiety as measured by the trait anxiety scale of the STPI (See Table 3, p. 67).
4. There will be no significant ($p < .05$) difference between the STPI mean state anxiety scores of subjects performing under enhanced and reduced anxiety conditions (See Table 3, p. 67).
5. There will be no significant ($p < .05$) difference among the STPI mean state curiosity scores of subjects with high, medium, and low trait curiosity as measured by the trait curiosity scale of the STPI (See Table 5, p. 70).
6. There will be no significant ($p < .05$) difference between the STPI mean state anger scores of subjects performing under enhanced and reduced anxiety conditions (See Table 7, p. 71).
7. There will be no significant ($p < .05$) difference between the STAI mean state anxiety scores of subjects performing under enhanced and reduced anxiety conditions as categorized by years of

formal study on an instrument or voice (See Table 9, p. 73).

8. Years of formal study and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality (See Table 10, p. 74).

9. Subjects' principal instrument (performance area) and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality (See Table 10, p. 74).

10. Subjects' sex and performance condition are independent of each other ($p < .05$) in their effect on judged performance quality (See Table 10, p. 74).

On the basis of results from the analyses, this researcher fails to reject all other hypotheses at the .05 level relating to areas such as:

1. Interactions on STAI and STPI mean state anxiety on STPI mean state curiosity and anger (dependent variables) with STAI and STPI trait anxiety or STPI trait curiosity and anger scores and performance condition (independent variables).

2. Differences between or interactions on mean performance ratings (judges' performance scores) (dependent variables), with trait anxiety and performance condition (independent variables).

3. Independence of performance condition and such variables as years of nonformal study and ensemble experience, performance "readiness," and subjective evaluations of performance ability, experience, or "readiness" on their effects on judged performance quality.

Differences in State Means Under Enhanced and Reduced Anxiety Performance Conditions

Based on a study by Hamann and Herlong (1979), it was hypothesized that subjects in this study would report greater elevations in A-State scores in the repertory performance condition (the enhanced anxiety condition) than in the nonrepertory performance condition (the reduced anxiety condition). The rejection of the null hypotheses, listed previously, 2, 4, and 7 indicates that a significant difference between A-State means was found. Subjects performing in the enhanced anxiety condition reported elevated anxiety scores as compared with their scores in the reduced anxiety situation. Of the 90 subjects administered the STAI (the principal dependent measure) state anxiety scale and the 78 subjects receiving the STPI (an exploratory dependent measure) state anxiety scale, all but one subject reported an increase in anxiety in the repertory situation. The greatest STAI A-State raw score difference between repertory and nonrepertory conditions for any one subject was 39 points and the smallest difference was one point. On the STPI state anxiety scale, the largest reported raw-score difference for any one subject in the two performance conditions was 20 points and the smallest difference was one point.

The STAI A-State scale mean in the nonrepertory category was $\overline{B}_1 = 34.21$, and in the repertory category was $\overline{B}_2 = 48.81$. Means for nonrepertory and repertory categories for STAI A-State scores, grouped by years of formal study were $\overline{B}_1 = 34.92$ and $\overline{B}_2 = 48.53$ respectively.

On the basis of these results, it can be concluded that subjects performing in a repertory condition as compared to nonrepertory conditions, will experience greater elevations in A-State scores. It would appear that college-level students, when performing for an audience comprised of their peers and an instructor, become more anxious than when performing in a room with a tape recorder.

A significant difference ($p < .05$) in STPI state anger means was also found. Seventy-eight subjects performing in the enhanced anxiety condition reported significant increases in state anger scores as compared to the reduced anxiety condition. The anger means were $\overline{B}_1 = 10.78$ (reduced anxiety condition) and $\overline{B}_2 = 13.42$ (enhanced anxiety condition).

The researcher observed during recording sessions that subjects who assumed they did not perform "well" under the repertory condition were "upset" with themselves. Subjects in the repertory condition indicated that physical conditions or elements (i.e., new or faulty reeds or strings, fatigue, and weather conditions) prevented them from performing at their "expected" standard. (It should be noted that while students assumed they did not perform "well" in one performance condition compared to another, judges' ratings did not support this belief.) Subjects' comments such as, "I've never played this 'poorly' before," were not uncommon. Although some physical conditions may have hindered subjects' performance abilities, the researcher observed that similar conditions existed in the nonrepertory condition, but the same anger response or comments were not reported by subjects. It would appear that subjects who exhibited increased anger states may have

"felt embarrassed" about their performances in front of their peers and instructor while not expressing the same feelings when performing in the nonrepertory situation. Subjects may have attempted to "save face" in front of peers by reporting poor physical conditions for reportedly poor performance abilities.

It can be concluded that college-level performers exhibit elevated anger A-State scores in anxious situations compared with scores in reduced anxious situations. It may be hypothesized that increased anger levels exhibited by subjects in anxious situations, may result from audience composition. An audience composed of peers and an instructor versus a nonrepertory situation, may initiate subjects' "face-saving" responses and anger "with self," when self-expected standards are not met.

Differences in A-State Means by A-Trait Categories

In the two-way ANOVA analyses, significant A-State mean differences were found between the STAI A-State, the STPI state anxiety, and the STPI state curiosity measures. When Tukey's studentized-range statistic was computed for each area, it was found that subjects categorized in the High Trait anxiety or curiosity categories had significantly higher state mean differences. In the STAI state anxiety mean comparisons, $\overline{A}_1$ (High Trait anxiety group) with $\overline{A}_2$ (Medium Trait), and $\overline{A}_1$ with $\overline{A}_3$ (Low Trait) was significant, but not $\overline{A}_2$ with $\overline{A}_3$. The same results were found when comparing STPI state anxiety and state curiosity means within trait categories. This would indicate that

subjects with High Trait anxiety or curiosity will have significantly higher state anxiety or curiosity scores as compared to subjects with Medium or Low Trait anxiety or curiosity.

Spielberger (1971), in his Trait-State Anxiety Theory, reports that:

> High A-Trait Ss [subjects] will perceive situations or circumstances that involve threats to self-esteem, such as failure or negative evaluation of performance, as more threatening than will Ss who are low in A-Trait, and will respond to such situations with greater elevations in A-State (p. 277).

The findings in this study, in relation to the previous statement from the Trait-State Anxiety Theory, would tend to support this assumption. It would appear that subjects with High A-Trait anxiety and curiosity exhibit significant elevations in A-State anxiety and curiosity as compared with subjects of Medium and Low A-Trait anxiety and curiosity. It may be hypothesized that subjects with High Trait anxiety perceived the enhanced performance condition as more threatening than did Medium and Low Trait anxiety subjects. It may be further stated that High Trait curiosity subjects found the enhanced anxiety condition (or perhaps the research study) to be more interesting than did Medium or Low Trait curiosity subjects.

Further statements of the theoretical assumptions of drive theory (D) and anxiety of Spence (1958) and Taylor (1956), or those of Spielberger (1966a, 1971, 1972a, 1978), cannot be supported by results obtained from this research study.

Anxiety and Judged Performance

Although null hypotheses concerning the effect of performance condition or judged performance quality failed to be rejected, it was observed that 58% of the subjects had their repertory (enhanced anxiety condition) performances judged as "superior," while only 42% of subjects had their nonrepertory (reduced anxiety condition) performances judged as "superior." It can be concluded that a majority of subjects in this research study performed in a superior manner in the enhanced anxiety performance situation.

In studies by Wolfe (1977), Wardle (1970, 1975), and Terwilliger (1972), in which researchers investigated the effects of behavior modification techniques in anxiety reduction on musical performance quality, it was assumed that anxiety deterred musical performance quality. Leglar (1975, 1978) reported that, "high anxiety tended to result in poorer performance levels," (p. 5202A). Based on the observation in this study that 58% of subjects' performances were judged "superior" in enhanced anxiety situation, it would appear that the effects of anxiety on subjects did not deter musical quality in high anxiety performance conditions for the majority of the sample.

Spencer (1969) reported:

> All students total performed significantly better, .001 level, in the jury than in voice lessons. All students total manifested significantly greater anxiety, .001 level, in the jury than in voice lessons (p. 238A).

Spencer's reported findings and this researcher's observations would tend not to support the observations of Leglar or the assumptions of

Wolfe, Wardle, and Terwilliger. Based on Spencer's research and the findings in this study, it could be stated that anxiety may not be detrimental to the judged performance quality of subjects' performances and may enhance performance.

Conclusions: Chi-Square Analyses

Of the 15 chi-square analyses, three relationships were found to be significant at the .05 level. Performance condition was found to be significantly related to (1) years of formal study, (2) subjects' performance area (instrument or voice), and (3) subjects' sex in its effect on judged performance quality. None of the other variables, in the analyses, were found to be significantly related to performance condition in their effects on judged performance quality.

Nonsignificant Variables

Variables that were not significantly related to performance condition were nonformal years of study, ensemble experience, solo experience (self-rating), solo-ensemble experience on instrument other than the principal instrument (self-rating), subjects accompanied or not accompanied in performance, subjects' confidence with accompanist, performance of composition from memory or music, performance of composition for an audience previously, performance of composition under the influence or noninfluence of medication, mental readiness, and technical readiness.

Subjects reported years of experience for nonformal study and ensemble experience. Subjects' subjective evaluations were recorded

for the experience variables, solo-ensemble experience on another instrument other than the principal instrument and solo experience on the instrument or voice recorded for the research study. These variables, plus the variable performance of composition for an audience previously, could be categorized as experience variables. Based on chi-square analyses, these types of experience variables are not significantly related to performance condition in their effects on judged quality of solo performances.

The variables mental and technical readiness, accompanied or nonaccompanied performances, subjects' confidence with accompanist, performance of composition from memory or music, and performance under the influence or noninfluence of medication--are not significantly related to performance condition in their effects on judged performance quality. According to instructors and students, who provided comments used to construct questionnaire items, all variables appeared to influence solo performance abilities or preparedness of performers. Although Leglar (1975, 1978) indicated that score removal (performance from memory) tended to result in poorer performance levels, there was no indication of similar results in this study.

Based on instructors' and students' comments, it may have been thought that performance condition and certain factors such as ensemble experience, memorization, and other subjective readiness and experience variables were independent of each other in their effect on judged performance quality. It can be concluded, based on results of this study, that these variables and performance condition are independent of each other in their effect on judged performance quality at the .05 level.

Significant Variables

Years of formal study and performance condition were found to be significantly related to each other in their effect on judged performance quality at the .05 level. Of the three levels of formal study--High (11-15 years), Medium (6-10 years), and Low (1-5 years)--90% of subjects in the High category had their repertory performance chosen as "superior" by judges, while 62% of subjects in the Medium category and 49% of subjects in the Low category had their repertory performances chosen as "superior." These findings would tend to support the observation of Hamann and Herlong (1979) that subjects with the "highest" years of formal study were rated superior in the anxious performance condition as compared to the reduced anxiety condition.

It could be hypothesized that subjects who have had formal study have acquired solo performance experience. Subjects can be provided with a consistent type of solo performance condition, one in which they perform for and are evaluated by instructors, in formal study settings. Subjects with High formal years of study may have acquired more solo performance experience than did subjects with Medium or Low years of formal study and may have performed in a superior manner in the enhanced anxiety condition as a result of this experience. If formal study provides for solo performance experience, then findings in this study would tend to be supported by those of Spencer (1969). Spencer reported that students with moderate performance experience were better performers in anxious situations than were students of limited experience. Therefore, formal study may provide performance experience that can assist subjects in enhanced anxiety solo

performance situations. (It should be noted that the variable, solo experience, in this study was a subjective evaluation of experience and would differ from "actual" experience in formal study.)

It may also be hypothesized that subjects with High formal training or years of study, have acquired greater technical and mental performance skills on their instruments as compared to subjects with Medium or Low years of formal study. (Technical and mental skills being discussed would differ from the variables listed previously, which were subjective evaluations of preparedness and not objective measurements being implied in years of formal study.) Increased technical and mental skills may aid students in high anxiety performance situations. An anxious situation may stimulate mental and technical abilities in individuals which might not be activated in a reduced anxiety situation. Performers, as a result of heightened mental and technical abilities, may perform in a superior manner in anxious situations.

It can be concluded that college-level subjects in this study with High formal years of study performed in a superior manner in the enhanced performance condition as compared to subjects with Medium or Low formal years of study. The findings in this study tend to be supported by similar results in studies of Hamann and Herlong (1979) and Spencer (1969).

Performance Area

Subjects' principal instrument (performance area) and performance condition were found to be significantly related to each other

($p < .05$) in their effect on judged performance quality. Subjects were divided into six groups, 15 subjects in each group, according to performance area. Eighty percent of the bowed string performers and pianists had their repertory performances rated as superior, while 67% of the woodwind, 53% of the vocal, 47% of the brass, and 20% of the guitar performers had their repertory performances selected as superior. On the basis of these results, it could be hypothesized that performers of bowed string instruments and pianists perform in a superior manner in anxious situations to a greater extent than do performers on other instruments. This could be a plausible conclusion since many students of the piano and the bowed string instruments tend to begin study at an early age and may acquire greater performance experience and confidence with their instruments than do other instrumental and vocal performers.

Performers on bowed string instruments and piano may also have greater opportunity to perform in solo situations than do other vocal and instrumental performers. Piano and bowed string instruments are often considered solo instruments. Often performers on these instruments are sought to perform at social functions (weddings, conventions, etc.) in a solo capacity.

Pianists and bowed string performers may perform in a superior manner in anxious solo performance situations because of greater "general" performance experience. Possibly, acquired solo performance experience may provide for heightened confidence and performance abilities in solo performance situations as compared to vocal or other instrumental performers.

In Table 18, an analysis of performance area by years of formal study reveals that pianists had the highest number of years of formal study. Bowed string, woodwind, vocal, brass, and guitar performers had progressively fewer years of formal training. With the exception of bowed string performers, the years of formal training analysis corresponds to a ranking of percentages of subjects' performances judged superior in repertory situations. It would appear that years of formal study, found not to be independent with performance condition in their effect on judged performance quality, could be the "actual" significant factor in this analysis.

Sex

Subjects' sex and performance condition were significantly related to each other in their effect on judged performance quality at the .05 level. Forty-three percent of the male and 71% of the female subjects had their repertory performances judged superior. Female subjects performed in a superior manner in the enhanced anxiety situation as compared to male subjects. Spencer (1969) reported that male students, on the average, were better vocal performers as compared to female vocal performers. If the criteria for superior performance in Spencer's study were based on results of judged performances in reduced and enhanced performance situations, the findings in this study would not support those of Spencer. On the basis of this study, it could be concluded that female subjects are superior performers in anxious situations as compared with male subjects.

Females in our society often are encouraged to develop musical skills at an early age. Males, conversely, may often be directed in other areas during early ages, such as sports activities. Females may begin the study of an instrument at an earlier age than do males and may therefore develop as solo performers sooner. In a college-level sample, as in this experiment, a larger percentage of females than males could be expected to perform in a superior manner in anxious solo situations, based on their experience.

In Table 19, an analysis of sex by formal years of study is shown. A study of this analysis reveals that a greater number of females were in the High or Medium formal years of study categories than were males. This finding could support the theory that females begin study of an instrument earlier than do males and develop as "mature" solo performers sooner. Analysis of these results could also indicate that performance condition and formal years of study have a greater influence on judged performance quality than did the variables performance condition or sex.

Summary of significant chi-square variables. Although the performance condition variables years of formal study, performance area, and sex were found not to be independent of each other in their effects on judged performance quality, analyses of Tables 18 and 19 provide data that might indicate years of formal study and performance condition have a greater significance in their effect on judged performance quality than do performance condition and performance area or sex. Each variable and performance condition may also not be independent in their effect on judged performance quality, as determined in the analyses. There is support for either theory.

On the basis of this study it can be concluded that performance condition and subjects' years of formal training, subjects' performance area, and subjects' sex are not independent in their effects on judged performance quality, in this sample. It may also be concluded that subjects with High years of formal study, performers on bowed string instruments and piano, and females tend to perform in a superior manner in anxious solo performance situations to that of subjects with Medium or Low years of formal training, performers on other instruments or voice, and males, respectively.

Summary

On the basis of analyses and observations, this researcher reached the following conclusions:

1. Anxiety inventories, specifically the STAI and STPI, are reliable and appropriate measures in a study of the effects of anxiety in musical performance.
2. Subjects with High Trait anxiety and curiosity exhibited significant ($p < .05$) increases in state anxiety and curiosity.
3. Subjects performing in enhanced anxiety situations exhibited significant ($p < .05$) increases in state anxiety and anger as compared to subjects' state anxiety and anger in reduced anxiety situations.
4. Subjects with High formal years of study, based on this study sample, perform in a superior manner in

enhanced performance conditions as compared to subjects with Medium or Low years of formal study.

5. Bowed string and piano subjects performed in a superior manner in enhanced performance situations, based on this study sample, as compared to woodwind, vocal, brass, or guitar subjects.
6. Female subjects, as compared with male subjects, performed in a superior manner in enhanced anxiety situations, based on this study sample.
7. There was a difference in the quality of musical performances of subjects observed in this study, as judged by a panel of adjudicators, performing under enhanced and reduced anxiety situations. This difference was not statistically significant, however.
8. Anxiety may not be detrimental to the judged quality of subjects' performances and may enhance performance.

Although this researcher's observations, and results from other studies on the effects of anxiety in musical performance, tend to support the conclusion that anxiety may not be detrimental to the judged quality of subjects' performances and may enhance performance, additional research is needed in this area to further support this theory. Independently administered replications of this research study should be performed to determine whether performance condition and the variables as years of formal study, performance area, and sex (found not to be independent in their effect on judged performance quality in this experiment) would be significant in their effect on judged performance quality in other samples.

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APPENDIX A

ADJUDICATOR PERFORMANCE RATING FORMS

DIRECTIONS: On the following pages you will find rating scales. These scales are numbered 1a, 1b, 2a, 2b, etc. The number of each performance is announced on the taped performances. You will notice that one composition is performed twice for each rating "page" or "set," i.e., one composition is performed for both 1a and 1b, another composition for 2a and 2b, and so forth. You should respond to each of the scales for each performance, i.e., listen to performance 1a and rate it, listen to performance 1b and rate it, listen to performance 2a and rate it, etc. Note that some performances, those for guitar and piano, do not have an intonation rating scale. Please rate the performances by circling one of the numbers for each of the scales; do not circle in-between numbers.

Each performance should be evaluated in context of your concept of an ideal performance, i.e., if you are listening to a violin performance on this tape, you should ask the question; how does this performance compare to my "ideal" of a performance of this work? Evaluate each performance by itself in context of your "ideal." Do not compare performances of a set. As mentioned previously, listen to one performance (1a) and rate it, listen to the next performance (1b) and rate it, and so on.

NOTE: Each performance for any "set" is different, that is, performance 1a is different from performance 1b, even though they are the same composition. (The difference may be that they were taped at different times, etc. I am not trying to imply a musical difference, that is for you to decide. What I am saying is that there is no attempt to "trick" you. The same performance was not used for both performances of 1a and 1b or of any other set. I feel that this needs to be mentioned as there have been studies in which this type of "trick" evaluation was used to determine psychological behaviors of judges. This is not one of those studies.)

Each performance has been limited to two minutes, even though the composition may be longer. This was done to keep listening time, for judges, down to a minimum and establish a "listening time norm/standard" from which you can gauge your rating time and procedure. Therefore, at the end of two minutes the performance of a work will be "faded out," if the work is longer than two minutes. Once again, please respond to all scales for each performance. Do not leave any scales "blank" for any reason. Thank you. If you have any questions concerning the rating procedures, please feel free to contact me. Telephone number: (The telephone number of the researcher was included in the original directions.)

PERFORMANCE

[Rhythmic Accuracy]
Excellent Fair
1------2------3------4------5

[Technical Competence]
Excellent Fair
1------2------3------4------5

[Phrasing]
Excellent Fair
1------2------3------4------5

[Expressiveness/Musicianship]
Excellent Fair
1------2------3------4------5

[Tone Quality]
Excellent Fair
1------2------3------4------5

[Total Performance]
Excellent Fair
1------2------3------4------5

PERFORMANCE

[Rhythmic Accuracy]
Excellent Fair
1------2------3------4------5

[Technical Competence]
Excellent Fair
1------2------3------4------5

[Phrasing]
Excellent Fair
1------2------3------4------5

[Expressiveness/Musicianship]
Excellent Fair
1------2------3------4------5

[Tone Quality]
Excellent Fair
1------2------3------4------5

[Total Performance]
Excellent Fair
1------2------3------4------5

PERFORMANCE

[Intonation]
Excellent Fair
1------2------3------4------5

[Rhythmic Accuracy]
Excellent Fair
1------2------3------4------5

[Technical Competence]
Excellent Fair
1------2------3------4------5

[Phrasing]
Excellent Fair
1------2------3------4------5

[Expressiveness/Musicianship]
Excellent Fair
1------2------3------4------5

[Tone Quality]
Excellent Fair
1------2------3------4------5

[Total Performance]
Excellent
1------2------3------4------5

PERFORMANCE

[Intonation]
Excellent Fair
1------2------3------4------5

[Rhythmic Accuracy]
Excellent Fair
1------2------3------4------5

[Technical Competence]
Excellent Fair
1------2------3------4------5

[Phrasing]
Excellent Fair
1------2------3------4------5

[Expressiveness/Musicianship]
Excellent Fair
1------2------3------4------5

[Tone Quality]
Excellent Fair
1------2------3------4------5

[Total Performance]
Excellent
1------2------3------4------5

APPENDIX B

ESTABLISHED RELIABILITY DATA FOR THE ADJUDICATOR PERFORMANCE RATING FORMS

ESTABLISHED RELIABILITY DATA FOR THE ADJUDICATOR PERFORMANCE RATING FORMS

Interjudge reliability was established on the adjudicator performance rating forms in a pilot study employing ten subjects. Subjects performed one composition in an enhanced anxiety condition and performed the same composition in a reduced anxiety condition. Subjects were four male and six female students studying privately at the University of North Carolina at Greensboro, School of Music. Instrument/vocal distribution was as follows: two guitarists, two pianists, two vocalists, two brass performers, and two bowed string performers.

Five adjudicators, two undergraduate college students and four music instructors; one public school and two university instructors, were administered the evaluation forms. Judges evaluated taped performances of subjects previously mentioned. Judge's individual total scores were summed and recorded (See Table 11).

A quotient of agreement statistic was computed between judges. The result of this computation produced a quotient of agreement of .76. There were 38 agreements and 12 disagreements among judges out of a possible 50 agreements. The mean range of enhanced and reduced anxiety performances for judges was: judge one, 17.9; judge two, 87.8; judge three, 36.2; judge four, 16.6; and judge five, 80.7 (See Table 12).

The Pearson product-moment correlation coefficient was computed between judges. The following correlations were found: lowest

correlation, r = .97; highest correlation, r = .99. The mean correlation between judges was computed to be r = .985. The most frequently occurring correlation was r = .99 (this correlation was reported 12 times out of 20). (See Table 13)

Table 11

Individual and Total Judge Performance Scoring

Performer/Situation		Judge 1	2	3	4	5	Total
1	Enhanced Anxiety	18	23	16	20	10	87
	Reduced Anxiety	22	34	9	19	12	85*
2	Enhanced Anxiety	13	11	23	17	12	76
	Reduced Anxiety	12	8	5	14	10	49*
3	Enhanced Anxiety	27	19	21	26	18	111
	Reduced Anxiety	25	14	16	15	15	85*
4	Enhanced Anxiety	20	9	19	19	17	84*
	Reduced Anxiety	27	10	33	21	18	109
5	Enhanced Anxiety	24	8	16	12	14	74
	Reduced Anxiety	14	9	5	10	12	50*
6	Enhanced Anxiety	19	13	18	23	16	89
	Reduced Anxiety	10	14	22	21	15	82*
7	Enhanced Anxiety	25	15	20	20	17	97*
	Reduced Anxiety	30	20	26	24	29	119
8	Enhanced Anxiety	17	15	33	20	19	104
	Reduced Anxiety	15	14	20	20	16	85*
9	Enhanced Anxiety	20	16	15	19	21	91*
	Reduced Anxiety	19	13	19	18	26	95
10	Enhanced Anxiety	21	19	14	22	17	93*
	Reduced Anxiety	18	14	22	21	20	95

*Performance rated "superior" of two performances.

Table 12

Mean Comparison of Judges Between Total Performances, Enhanced and Reduced Anxiety Performances

Judges	Performance		
	Total	Enhanced	Reduced
#1	29.35	20.4	38.3
#2	58.7	14.8	102.6
#3	37.6	19.5	55.7
#4	28.1	19.8	36.4
#5	20.5	16.1	24.9

Performance "total" range = 38.2
Performance "enhanced anxiety" range = 5.6
Performance "reduced anxiety" range = 77.7

Table 13

Inter-Judge Reliability Employing the Pearson Product-Moment Correlation Coefficient

Judges	Pearson Correlation Coefficient				
	Judges				
	1	2	3	4	5
#1	1.0	.99	.99	.99	.98
#2	.99	1.0	.99	.99	.97
#3	.99	.99	1.0	.99	.98
#4	.99	.99	.99	1.0	.98
#5	.98	.97	.98	.98	1.0

APPENDIX C

QUESTIONNAIRE

Questionnaire

Name _____ Instrument or Voice _____

1. How many years have you studied this instrument or voice formally? (Study with a private teacher)

   _____ (years)

2. How many years have you studied this instrument or voice without the aid of a private teacher? (Public school experience, etc.)

   _____ (years)

3. Do you perform in any type of ensemble with this instrument or voice? (Check one)

   yes [ ] no [ ]

4. If you have performed in an ensemble(s) with this instrument or voice, how many years have you had this type of experience? (Include public school, civic, and college experience)

   _____ (years)

5. Rate the amount of solo experience you have had performing for an audience with this instrument or voice. (Circle the appropriate response below on the scale of 1 to 5.)

   Limited Considerable

   1- - - - - - 2- - - - - - 3- - - - - - 4- - - - - - 5

6. Do you, or have you performed on another instrument or voice other than the one mentioned above? (Check one)

   yes [ ] no [ ]

7. If you are now performing, or have performed on another instrument or voice, rate the amount of experience, both solo and ensemble, you have had performing in front of an audience with this instrument or voice. (Include public school, civic, and college experience.) (Circle the appropriate response below on the scale of 1 to 5.)

   Limited Considerable

   1- - - - - - 2- - - - - - 3- - - - - - 4- - - - - - 5

THE FOLLOWING QUESTIONS REFER SPECIFICALLY TO THE COMPOSITION YOU WILL PERFORM FOR THIS PROJECT.

[Check the appropriate response for questions 8 - 14]

8. Will you have an accompanist (will you be accompanied) in these performances?

   yes [ ] no [ ]

9. If you will be accompanied, do you feel comfortable/confident performing this work with your accompanist? (i.e., have you had enough rehearsal time together, is the ensemble "tight/together," etc.)

   yes [ ] no [ ]

10. Have you performed this composition for an audience previously?

    yes [ ] no [ ]

11. Is this piece to be performed from memory (without music) or with music?

    From memory [ ] From music [ ]

12. If from memory, do you feel confident performing this work from memory?

    yes [ ] no [ ]

13. If from music, do you feel confident performing this work from music?

    yes [ ] no [ ]

14. Will you be on any type of medication when performing this work? (i.e., cough medicine, etc.)

    yes [ ] no [ ]

[For questions 15 and 16, circle the appropriate response on the given scale of 1 to 5]

15. Do you feel mentally prepared to perform this composition in front of an audience?

I FEEL:

Insecure — Confident

1- - - - - - 2- - - - - - 3- - - - - - 4- - - - - - 5

16. Do you feel technically prepared to perform this composition in front of an audience?

I FEEL:

Insecure — Confident

1- - - - - - 2- - - - - - 3- - - - - - 4- - - - - - 5

APPENDIX D

TABLES

Table 14

Performance Area by STAI

A-Trait Anxiety

Trait Anxiety	Performance Area	Male Subjects	Female Subjects	Sub-Total	Total
Low	W*	1	5	6	
	B*	5	1	6	
	S*	2	2	4	
	V*	2	4	6	
	G*	2	0	2	
	P*	0	6	6	
		12	18	30	30
Medium	W	1	4	5	
	B	3	2	5	
	S	3	4	7	
	V	1	1	2	
	G	8	0	8	
	P	0	3	3	
		16	14	30	30
High	W	3	1	4	
	B	2	2	4	
	S	0	4	4	
	V	1	6	7	
	G	5	0	5	
	P	3	3	6	
		14	16	30	30
		42	48	90	90

W* = Woodwind B* = Brass S* = Bowed String V* = Voice G* = Guitar

P* = Piano

Table 15

Performance Area by STPI

A-Trait Anxiety

Trait Anxiety	Performance Area	Male Subjects	Female Subjects	Sub-Total	Total
Low	W*	1	6	7	
	B*	4	2	6	
	S*	1	1	2	
	V*	2	1	3	
	G*	1	0	1	
	P*	1	6	7	
		10	16	26	26
Medium	W	1	2	3	
	B	5	1	6	
	S	4	4	8	
	V	0	4	4	
	G	1	0	1	
	P	0	4	4	
		11	15	26	26
High	W	3	2	5	
	B	1	2	3	
	S	0	5	5	
	V	2	6	8	
	G	1	0	1	
	P	2	2	4	
		9	17	26	26
		30	48	78	78

W* = Woodwind B* = Brass S* = Bowed String V* = Voice G* = Guitar

P* = Piano

Table 16

Performance Area by STPI

A-Trait Curiosity

Trait Curiosity	Performance Area	Male Subjects	Female Subjects	Sub-Total	Total
Low	W*	1	2	3	
	B*	5	2	7	
	S*	1	1	2	
	V*	3	6	9	
	G*	1	0	1	
	P*	0	4	4	
		11	15	26	26
Medium	W	2	4	6	
	B	3	0	3	
	S	2	5	7	
	V	1	4	5	
	G	2	0	2	
	P	2	1	3	
		12	14	26	26
High	W	2	4	6	
	B	2	3	5	
	S	2	4	6	
	V	0	1	1	
	G	0	0	0	
	P	1	7	8	
		7	19	26	26
		30	48	78	78

W* = Woodwind B* = Brass S* = Bowed String V* = Voice G* = Guitar

P* = Piano

Table 17

Performance Area by STPI

A-Trait Anger

Trait Anger	Performance Area	Male Subjects	Female Subjects	Sub-Total	Total
Low	W*	0	3	3	
	B*	4	1	5	
	S*	1	3	4	
	V*	1	4	5	
	G*	1	0	1	
	P*	1	7	8	
		8	18	26	26
Medium	W	0	5	5	
	B	3	3	6	
	S	3	3	6	
	V	0	5	5	
	G	1	0	1	
	P	1	2	3	
		8	18	26	26
High	W	5	2	7	
	B	3	1	4	
	S	1	4	5	
	V	3	2	5	
	G	1	0	1	
	P	1	3	4	
		14	12	26	26
		30	48	78	78

W* = Woodwind B* = Brass S* = Bowed String V* = Voice G* = Guitar

P* = Piano

Table 18

Performance Areas by Years of Formal Training

Formal Study	Woodwinds	Brass	Bowed Strings	Guitar	Voice	Piano	Total
High	1	0	2	0	0	7	10
Medium	6	3	7	0	6	7	29
Low	8	12	6	15	9	1	51
	15	15	15	15	15	15	90
	*M = 5 *F = 10	M = 10 F = 5	M = 5 F = 10	M = 15 F = 0	M = 4 F = 11	M = 3 F = 12	

*M = Male Subjects *F = Female Subjects

Table 19

Subjects' Sex by Years of Formal Training

Formal Years of Study	Male Subjects	Female Subjects	Total
High	2	8	10
Medium	8	21	29
Low	32	19	51
	42	48	90